

A koala is shown climbing a tree trunk, its body pressed against the rough bark. The koala's head is tilted back, and its mouth is slightly open. The tree trunk is vertical and occupies the left half of the image. The background is a solid blue gradient.

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Biodiversity Development Assessment

70 Ashford Avenue
Milperra

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(REF: 18HPS03)



Biodiversity Development Assessment Report

70 ASHFORD AVENUE, MILPERRA

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The mapping is indicative of available space and location of features which may prove critical in assessing the viability of the proposed works. Mapping has been produced on a map base with an inherent level of inaccuracy, the location of all mapped features are to be confirmed by a registered surveyor.

List of abbreviations

APZ	asset protection zone
BAM	Biodiversity Assessment Method
BAR	Biodiversity Assessment Report
<i>BC Act</i>	<i>Biodiversity Conservation Act (2016)</i>
<i>BC Reg</i>	<i>Biodiversity Conservation Regulation (2017)</i>
BCAR	Biodiversity Certification Assessment Report
BDAR	Biodiversity Development Assessment Report
BOS	Biodiversity Offset Scheme
BPA	bushfire protection assessment
BSSAR	Biodiversity Stewardship Site Assessment Report
CEEC	Critically endangered ecological community
<i>CM Act</i>	<i>Coastal Management Act 2016</i>
DAWE	Department of Agriculture, Water and the Environment
DCP	development control plan
DEC	NSW Department of Environment and Conservation (superseded by DECC from April 2007)
DECC	NSW Department of Environment and Climate Change (superseded by DECCW from October 2009)
DECCW	NSW Department of Environment, Climate Change and Water (superseded by OEHL from April 2011)
DEWHA	Commonwealth Department of Environment, Water, Heritage & the Arts (superseded by SEWPAC)
DOEE	Commonwealth Department of Environment & Energy (superseded by DAWE February 2020)
DPIE	NSW Department of Planning, Industry and Environment
EEC	endangered ecological community
EPA	Environment Protection Authority
<i>EP&A Act</i>	<i>Environmental Planning and Assessment Act (1979)</i>
<i>EPBC Act</i>	<i>Environment Protection and Biodiversity Conservation Act (1999)</i>
<i>FM Act</i>	<i>Fisheries Management Act</i>
IBRA	Interim Biogeographic Regionalisation for Australia
LEP	local environmental plan
LGA	local government area
<i>LLS Act</i>	<i>Local Land Services Act (2013)</i>
NES	national environmental significance
<i>NPW Act</i>	<i>National Parks and Wildlife Act (1974)</i>
NRAR	Natural Resources Access Regulator (NSW)
NSW DPI	NSW Department of Industry and Investment
OEHL	Office of Environment and Heritage (superseded by DPIE from August 2019)
PCT	plant community type
PFC	projected foliage cover
RFS	NSW Rural Fire Service
ROTAP	rare or threatened Australian plants
SAII	Serious And Irreversible Impacts
SEPP	State Environmental Planning Policy
SEWPAC	Commonwealth Dept. of Sustainability, Environment, Water, Population & Communities (superseded by DOEE)
SIS	species impact statement
SULE	safe useful life expectancy
TEC	threatened ecological community
TPZ	tree preservation zone
<i>TSC Act</i>	<i>Threatened Species Conservation Act (1995) – Superseded by the Biodiversity Conservation Act (2016)</i>
VMP	vegetation management plan

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Background

1

Travers bushfire & ecology has been engaged to undertake a biodiversity development assessment within the far eastern portion of Lot 612 DP 837981 and Part Lot 13 DP 584447, 70 Ashford Avenue, Milperra, in the Canterbury-Bankstown local government area (LGA). The extent of the study area is shown in Figure 1 below. These lots are subject to a proposed development application for an aged care facility and will hereafter be referred to as the 'study area'.

The area containing the proposed development, APZs and all associated impact on habitat features is hereafter referred to as the 'development footprint' (refer to Figure 2).

The proposal shall be assessed under the *Biodiversity Conservation Act (BC Act)*, 2016.



Figure 1 – Study area, remnant native vegetation and development footprint

Within the study area exists a portion of Bankstown Golf Club which includes car parking, the club house, putting green, practice nets and maintenance sheds. It is proposed to demolish these to provide a seniors living complex – serviced self-care housing.

The proposed development layout is shown in Figure 2 below.

4.0

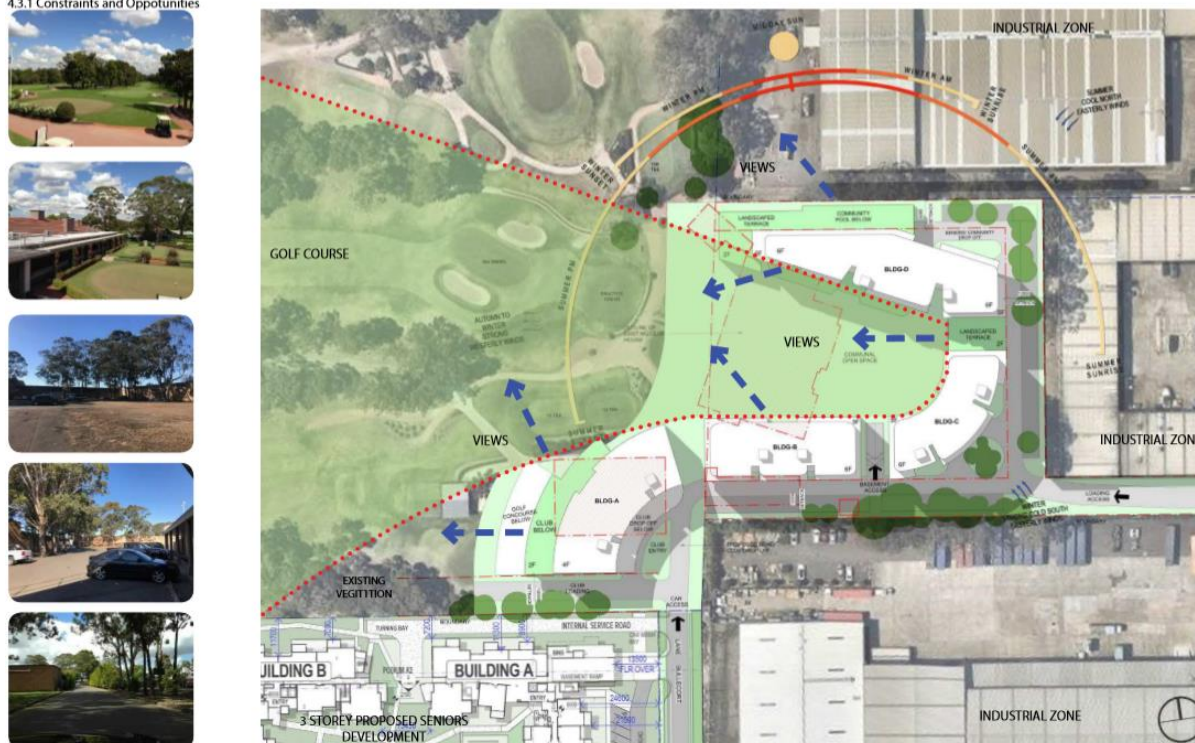


Figure 2 – Proposed development

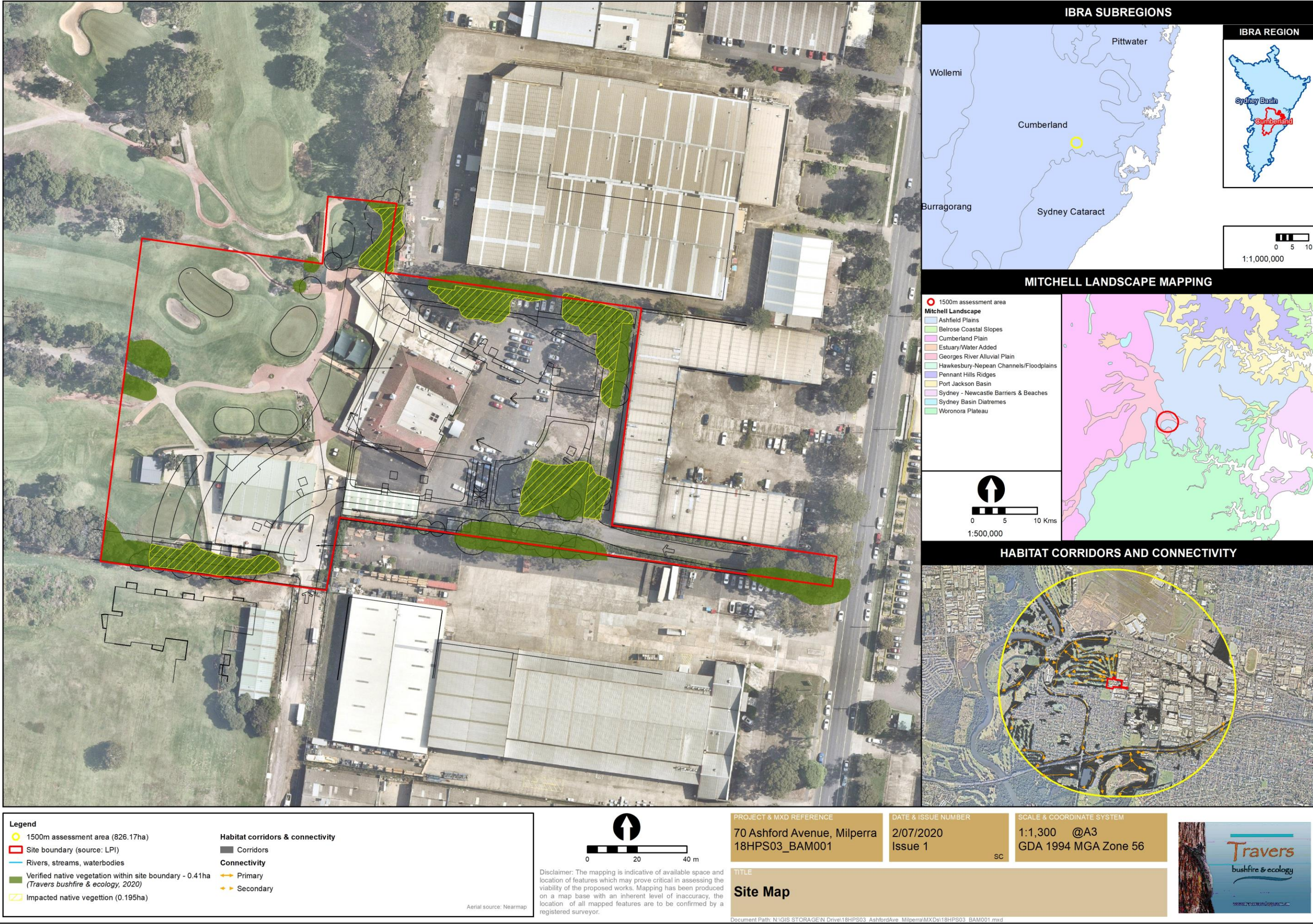
1.2 Site description

Table 1 provides a summary of the planning, cadastral, topographical, and disturbance details of the development footprint.

Table 1 – Site features

Location	Lot 612 DP 837981 and Part Lot 13 DP 584447, 70 Ashford Avenue, Milperra (refer to Figure 1)
Area	Approximately 2.5 ha
Local government area	City of Canterbury-Bankstown
Current zoning	RE2 – Private Recreation
Grid reference	314000E 6243200N MGA-56
Elevation	Approximately 10m AHD
Topography	Situated on level grounds with 0-1-degree slope
Geology and soils	Geology: Ashfield Shale Soils: Blacktown Soil Landscape https://www.environment.nsw.gov.au/Salis5app/resources/spade/reports/9030bt.pdf
Catchment, drainage and stream order	There are no creek lines or drainages within the study area, although there is an ephemeral drainage line (not a watercourse) along the southern edge of the golf course at the south-western edge of the study area. The local catchment is the Georges River. This river is located approximately 1.0 km to the north-west of the study area.
Existing land use	Golf course club house, car park and putting green.
Connectivity features	Refer to section 3.7

The location map, Figure 1.3 shows the proposal over the top of the existing development. The potential impact area is shown by diagonal yellow lines. Some trees will be retained within these areas although it is expected that there will be some level of disturbance to the ground layer, despite there being very little native vegetation present. Therefore, the level of impact upon native vegetation shown is on the cautious side, measured at 0.195 ha.





Flora

2

2.1 Survey

Botanical survey was undertaken on 27 June 2020 over a time frame of approximately 2.5 hrs.

Botanical survey included a random meander in accordance with *Cropper* (1993) to gain a full species list of the plants within the site, and then one (1) BAM quadrat of 0.1 ha was undertaken within the larger patch of native vegetation where the access opens to the existing car park. A review of the *Atlas of NSW Wildlife* (DPIE 2020) was undertaken prior to the site visit to determine threatened species previously recorded within 10 km of the development footprint, and relevant target searches were undertaken as suited, generally as near-linear transects underneath or adjacent to remnant canopy vegetation.

All naturally occurring species were identified to species level where possible, and are listed in Appendix 1.

2.2 Vegetation communities

The Native Vegetation of the Sydney Metropolitan Area OEH (2016) maps the vegetation within the site as being 'not assessed – urban exotic / native', with the narrow strips adjacent to the golf fairways as PCT 724 Broad-leaved Ironbark - Grey Box - *Melaleuca decora* grassy open forest on clay/ gravel soils of the Cumberland Plain, Sydney Basin.

Field verification of the entire study area found the following vegetation communities:

- PCT 724 - Broad-leaved Ironbark - Grey Box - *Melaleuca decora* grassy open forest on clay/ gravel soils of the Cumberland Plain, Sydney Basin
- No PCT – Landscaped Gardens

PCT 724 - Broad-leaved Ironbark - Grey Box - *Melaleuca decora* grassy open forest on clay/ gravel soils of the Cumberland Plain, Sydney Basin

Field validation confirms that the vegetation across the site appears to be commensurate with PCT 724. Whilst there are no *Melaleuca* trees surrounding the car park, there is a strip of *Melaleuca decora* in the south-western corner. The trees on the fairways also appear commensurate with those found in this community.

Existing native vegetation is of poor quality, comprising of canopy trees which have been impacted by bitumen from the car park, particularly along the northern boundary, as well as soil compaction from cars parking on the grassy / dirt areas in the eastern portion of the study area. There is no native mid-storey present, and the ground layer is predominantly exotic grasses and herbs.

Canopy – *Eucalyptus moluccana* (Grey Box) comprises almost all of the *Eucalyptus* trees within the study area. There were very few *Eucalyptus tereticornis* (Forest Red Gum) as well, and along a drainage line at the south-western corner, there was *Melaleuca decora*. Canopy cover within mapped remnants is approximately 25-40% in *Eucalypt*-dominant patches, and

60% in Melaleuca-dominant patches. The height of the Eucalypt patches ranges mostly between 15-25m tall. The height of the Melaleuca patches is approximately 10-12m tall.

Mid-storey – absent / cleared.

Ground layer – There is very limited native vegetation in the ground layer due to previous clearing, ongoing maintenance and cars parked between the trees.

Native species comprise approximately 1-10% cover including but not limited to *Cynodon dactylon*, *Microlaena stipoides*, *Einadia nutans* subsp. *linifolia*, *Einadia trigonos*, *Glycine clandestina*, *Rytidosperma tenuius*, *Dichondra repens*, and *Cyperus gracilis*.

Common exotic species (outside of landscaped areas) include *Ehrharta erecta*, *Modiola carolinana*, *Hypochaeris radicata*, *Araujia sericifera*, *Plantago lanceolata*, *Bidens pilosa*, *Sonchus oleraceus*, *Senecio madagascariensis* and *Cenchrus clandestinus*.



Photo 1 – Remnant Eucalypt trees along northern boundary



Photo 2 – Remnant Eucalypts in north-east corner



Photo 3 – Remnant Eucalypts in south-east corner where BAM plot was undertaken



Photo 4 – Narrow strip of *Melaleuca decora* in south-western corner of the study area

Landscaped Gardens

This describes the planted garden beds within the study area that contain mostly exotic species not attributable to a native plant community. Examples around the study area are shown in Photos 5-7.

Some common planted species include *Buxus microphylla*, *Agapanthus praecox*, *Callistemon viminalis*, *Syzygium sp.*, *Zamia sp.*, *Photinia serratifolia*, *Gardenia floribunda*, *Doryanthes excelsa*, *Harpephyllum caffrum*, *Camellia sasanqua*, *Dietes grandiflora*, *Nandina domestica* and *Cordyline stricta*.



Photo 5 – Landscaped gardens example 1



Photo 6 – Landscaped gardens example 2



Photo 7 – Landscaped driveway entry

2.3 Threatened flora species

BC Act – A search of the *Atlas of NSW Wildlife* (DPIE, 2020) indicated a list of species that have been recorded within a 10 km radius of the development footprint. These species are listed in Table 7 (Appendix 2) and are considered for potential habitat within the development footprint.

EPBC Act – A review of the schedules of the *EPBC Act* indicated the potential for a list of threatened flora species to occur within a 10km radius of the development footprint. These species have also been listed in Table 7 for consideration of potential to occur.

There is potential habitat for a few threatened species such as *Acacia pubescens* and *Pimelea spicata*. However, given that the shrub and ground layer vegetation is very disturbed by cars parking on the grassed areas amongst the trees, soil deposits and piles of vegetation waste, it was considered highly unlikely that specimens of either species would have likely survived. Despite there being likely habitat, a search was still undertaken in linear transects or belt transects amongst areas of remnant trees. No specimens were detected.

Based on the habitat assessment within Table 7 (Appendix 2), it is considered that the development footprint provides no potential habitat for threatened flora species due to the very poor condition of the vegetation remnant, ongoing management that would suppress and deplete the soil seed bank, cars parking on the dirt between remnant trees and isolation or fragmentation of the remnants. Some species may also be vagrant to the locality, incorrect soil / geology properties or many years since the last local sighting. Given the above reasons, no Test of Significance on threatened flora species will be required.

Given that there are no threatened flora species present, a test of significance is not required under the *BC Act*, and no referral required under the *EPBC Act*.

2.4 Endangered flora populations

The endangered flora populations listed below are known to occur within a 10 km radius of the study area:

- Tadgell's Bluebell in the local government areas of Auburn, Bankstown, Baulkham Hills, Canterbury, Hornsby, Parramatta and Strathfield
- *Marsdenia viridiflora* R. Br. subsp. *viridiflora* population in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith local government areas.
- *Pomaderris prunifolia* in the Parramatta, Auburn, Strathfield and Bankstown Local Government Areas
- *Allocasuarina diminuta* subsp. *mimica* population in the Sutherland Shire and Liverpool City local government areas
- Gosford Wattle, Hurstville and Kogarah Local Government Areas
- *Prostanthera saxicola* population in Sutherland and Liverpool local government areas

The last three (3) listed endangered flora populations are not registered in the Bankstown LGA (Canterbury – Bankstown) therefore do not require consideration.

Tadgell's Bluebell – A small herb mostly aligned with the Villawood Soil Series in Western Sydney in disturbed and moist sites, often with fine ironstone (laterite). There are records from 2015 approximately 1 km to the south. As the species is known from disturbed sites, there is possibly marginal habitat present. Survey in belt transects was undertaken where the vegetation was wide enough, and no specimens were observed.

Marsdenia viridiflora subsp. *viridiflora* – A shrubby vine with fruit like Moth Vine but distinct leaves. Usually grows in woodland and scrub in Cumberland Plain Woodland, Shale-Gravel Transition Forest, Shale-Sandstone Transition Forest, River-flat Eucalypt Forest, Castlereagh Ironbark Forest and Hinterland Dry Rainforest. All current recordings of the species are north of the study area, although there are a few records less than 10 years old and within 3 km. The ground layer and mid-storey is likely to be too disturbed for this species. Survey in belt transects was undertaken where the vegetation was wide enough, and no specimens were observed.

Pomaderris prunifolia – The species is a small shrub to 3m tall usually growing on the edges of creeks. There are only limited records of the species that have been recorded since the year 2000, and all previous sightings are to the north and at least 4 km away. It is unlikely that the site would contain suitable habitat for the species and thus no target surveys were undertaken specifically for specimens of this endangered population.

Three (3) of the six (6) listed endangered flora populations are not attributed to the Bankstown LGA and therefore can be ruled out. It was considered that the habitat attributes coupled with the species distribution and age of records made the site likely to be unsuitable for *Pomaderris prunifolia*. It was considered that there was some limited habitat potential for *Tadgell's Bluebell* and *Marsdenia viridiflora* subsp. *viridiflora* however no specimens were sighted.

2.5 Threatened ecological communities

PCT 724 is commensurate with the *BC Act* listed Shale Gravel Transition Forest of the Sydney Basin Bioregion which is listed as endangered. There are small fragmented pockets of vegetation throughout the study area, and these are also considered somewhat isolated as the understorey is depauperate and has limited ability to regenerate.

Within the study area, all remnant native vegetation has been assigned PCT 724 and considered to be part of this endangered ecological community (EEC). The proposal will impact up to 0.195 ha of native vegetation. Based upon the initial draft Arborist report, it has been identified that thirteen (13) trees of eighty-two (82) would likely be removed for the development.

It should be noted that the vegetation is comprised of very few native understorey species including no shrub layer. When preparing a report that requires entry into the Biodiversity Offset Scheme (BOS), data from the botanical plots are put into the BAM calculator to determine the Vegetation Integrity Score. We have applied the plot data to the calculator from the singular plot with estimated percentage of 15% for the coverage of native vegetation within the 1,500 m buffer (Location Map). The composition score was 10.5, the structure condition score was 29.4 and the function condition score was 36.8, making the Vegetation Integrity Score only 22.5 (a low score).

Despite its EEC status, the importance of the vegetation to be impacted is low because of its condition, fragmentation and isolation.

The mitigation measures identify that landscaping is to predominately utilise species of Shale Gravel Transition Forest origin that will replace the trees being lost, and provide some level of native understorey.

The Test of Significance in Appendix 3 concludes that the proposal will not cause a significant impact upon the Shale Gravel Transition Forest.

With respect to the *EPBC Act*, this community forms part of the Cumberland Plain Shale Woodlands and Shale Gravel Transition Forest which is listed as critically endangered. For recognition under the *EPBC Act* definition, the vegetation remnant must meet selected criteria.

Q1 – Tree cover 10% or more? Yes – Go to Q2

Q2 – Patch size 0.5 ha or more? Yes – Go to Q3

Q3 – Perennial understorey is comprised of 50% or more in native species? No – Go to Q4

Q4 – Is the patch size 5 ha or more? Yes (highly fragmented throughout the golf course) and just over 5 ha in extent – Go to Q5

Q5 - Perennial understorey is comprised of 30% or more in native species? No – not commensurate with EPBC Listing.

Question 5 if answering no, means the vegetation is not commensurate with the *EPBC Act* listing of the community. No further assessments are required. Figure 4 shows a flowchart to assist with determining whether or not the vegetation patch meets the criteria.

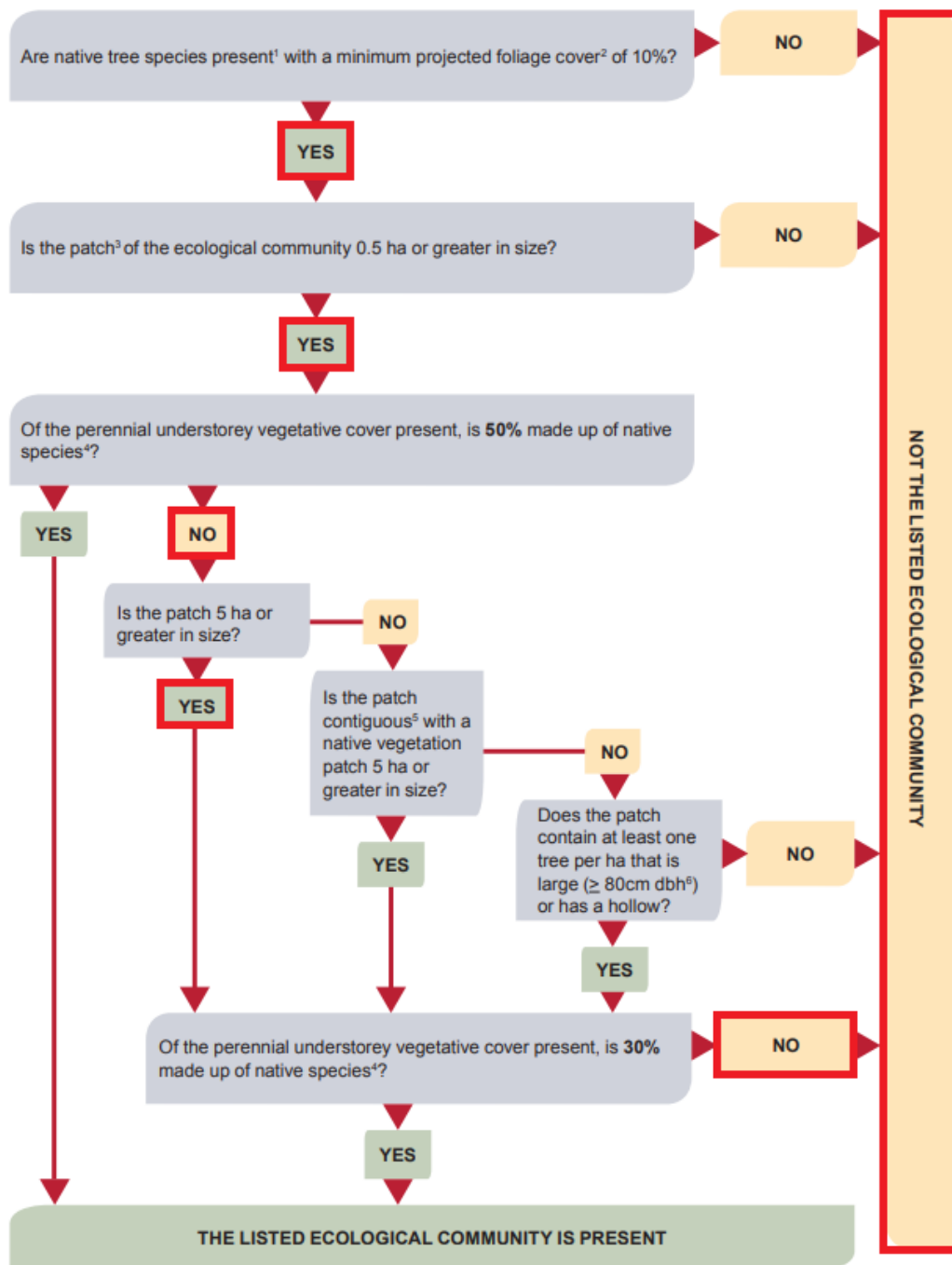


Figure 4 – Flowchart for identifying Cumberland Plain Shale Woodlands and Shale Gravel Transition Forest

2.6 SEPP (Vegetation in Non-Rural Areas) 2017

The *State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017* (Vegetation SEPP) was one of a suite of Land Management and Biodiversity Conservation (LMBC) reforms that commenced in New South Wales on 25 August 2017. The Vegetation SEPP (the SEPP) works together with the *Biodiversity Conservation Act 2016* and the *Local Land Services Amendment Act 2016* to create a framework for the regulation of clearing of native vegetation in NSW.

As 'development consent' is required for the proposed works the Vegetation SEPP does not apply.



Fauna

3

3.1 Survey

Fauna survey extended 150 m beyond the study area to the east into the golf course in search for significant habitat trees and potential roosts for threatened owl species. Fauna survey including afternoon/morning diurnal survey, nocturnal survey and threatened species habitat assessment was undertaken within the subject site and nearby surrounds on 22nd and 23rd of June 2020.

Diurnal fauna survey included:

- Opportunistic frog and reptile habitat searches,
- Opportunistic terrestrial snail searches,
- 3x bird census points (out to a radius of 30-50m for 15 minutes),
- Opportunistic bird call and activity survey between census points,
- Bat habitat roost searches,
- Habitat tree survey,
- Significant habitat tree survey,
- Large Forest Owl roost search.

Significant habitat trees are defined as trees containing large hollows suitable for owls/cockatoos and/or two or more good quality medium hollows and/or several small hollows and/or a tree showing notable use by a threatened species (e.g. sap feed tree, raptor nest tree, microbat roost, etc.). However, none were recorded within the study area.

Weather conditions at the time of diurnal survey on the 22nd of June were 2/8 cloud, 16km W wind, no rain, 14°C between 15:20 – 17:00.

Weather conditions at the time of diurnal survey on the 23rd of June were 1/8 cloud, no wind, no rain, 8°C between 08:30 – 09:50.

Nocturnal fauna survey included:

- Spotlighting,
- Frog call identification,
- Ultrasonic microbat recording (x2 passive recording stations),
- Owl call-playback (Masked Owl and Barking Owl),

Weather conditions at the time of nocturnal survey were 3/8 cloud, 11km W wind, no rain, 1/4 moon, 12-11°C between 17:15 – 18:00.

Specific survey effort locations and results are shown on Table 5. All fauna species recorded during survey within the development footprint and nearby surrounds are listed in Table 7 (Appendix 1).

A review of the Atlas of NSW Wildlife (DPIE 2020) was undertaken prior to the site visit to determine threatened species previously recorded within 10km of the development footprint.

Survey onsite was limited for threatened bat species as the survey period for species listed with potential to occur is during the summer periods when activity is at its peak (for breeding purposes).

3.2 Habitat features

The following notable habitat features were observed present:

- Winter and summer nectar producing tree species, principally *Eucalyptus sp*
- Ephemeral drainage lines
- Surface soils suitable for foraging by bandicoots

Significant habitat trees and hollow-bearing trees were surveyed during the diurnal fauna survey however none were recorded. Given the absence of this feature, the site is unlikely to support breeding habitat for threatened microbats who breed in tree hollows, therefore reducing the need for summer survey.

3.3 Threatened fauna species

BC Act – A search of the *Atlas of NSW Wildlife* (DPIE, 2020) provided a list of threatened fauna species previously recorded within a 10km radius of the development footprint. These species are listed in Table 8 (Appendix 2) and are considered for potential habitat within the study area.

EPBC Act – A review of the schedules of the *EPBC Act* identified a list of threatened fauna species or species habitat likely to occur within a 10 km radius of the development footprint. These species have also been listed in Table 8.

In accordance with Table 8 (Appendix 2) the following state and nationally listed threatened fauna species are considered to have suitable habitat with varying potential to occur within the study area. The state listed species will be considered in the test of significance (Appendix 3):

Table 2 – Threatened fauna species with suitable habitat present

Common name	BC Act	EPBC Act	Potential to occur
Little Lorikeet	V	-	Recorded
Large Bent-winged Bat	V	-	Recorded
Grey-headed Flying-fox	V	V	✓
Little Eagle	V	-	Low
Yellow-bellied Sheathtail-bat	V	-	Low
Eastern Coastal Free-tailed Bat	V	-	Low
Large-eared Pied Bat	V	V	Low
Eastern False Pipistrelle	V	-	Low
Little Bent-winged Bat	V	-	Low
Spotted Harrier	V	-	Unlikely
White-bellied Sea Eagle	V	-	Unlikely
Square-tailed Kite	V	-	Unlikely
Swift Parrot	E	E	Unlikely
Powerful Owl	V	-	Unlikely
Masked Owl	V	-	Unlikely
Varied Sittella	V	-	Unlikely
Dusky Woodswallow	V	-	Unlikely
Scarlet Robin	V	-	Unlikely

Common name	BC Act	EPBC Act	Potential to occur
Southern Myotis	V	-	Unlikely
Greater Broad-nosed Bat	V	-	Unlikely

The state test of significance assessment (Appendix 3) and a review of *EPBC Act* impact criteria (Appendix 5) concluded that the proposed development will not have a significant impact on threatened fauna species. Therefore, (a) a Species Impact Statement is not required in respect to fauna for the proposal and (b) biodiversity offsetting is not required.

Fisheries Management Act (FM Act) – No habitats suitable for threatened aquatic species were observed within the study area and as such the provisions of this act do not require any further consideration.

3.4 Protected migratory species (National)

The *EPBC Act Protected Matters Report* provides additionally listed terrestrial, wetland and marine migratory species of national significance likely to occur, or with habitat for these species likely to occur, within a 10 km radius of the development footprint. The habitat potential of migratory species is considered in Table 9 (Appendix 2). The habitat potential of threatened migratory species are instead considered with other threatened species in Table 8 (Appendix 2).

No nationally protected migratory bird species were recorded present within the study area during survey. Each of these migratory species protected under the *EPBC Act* do not likely contain any breeding habitat or habitat otherwise of importance within the study area. Therefore, these species will not likely offer any constraint to the proposal.

3.5 Endangered fauna populations

There are no endangered fauna populations identified specifically to the City of Canterbury – Bankstown LGA; however, the site does fall within the Sydney Metropolitan Catchment Management Authority area. An endangered population of White-fronted Chat (*Epthianura albifrons*) is identified to this area however this is made up of two known isolated sub-populations; one at Newington Nature Reserve on the Parramatta River and one at Towra Point Nature Reserve at Kurnell.

3.6 SEPP (Koala Habitat Protection) 2019

The City of Canterbury – Bankstown LGA is not listed in Schedule 1 of the new State Environmental Planning Policy (SEPP) Koala Habitat Protection 2019 therefore no considerations to this policy apply to the study area.



Figure 5 – Koala SEPP mapping of the local area

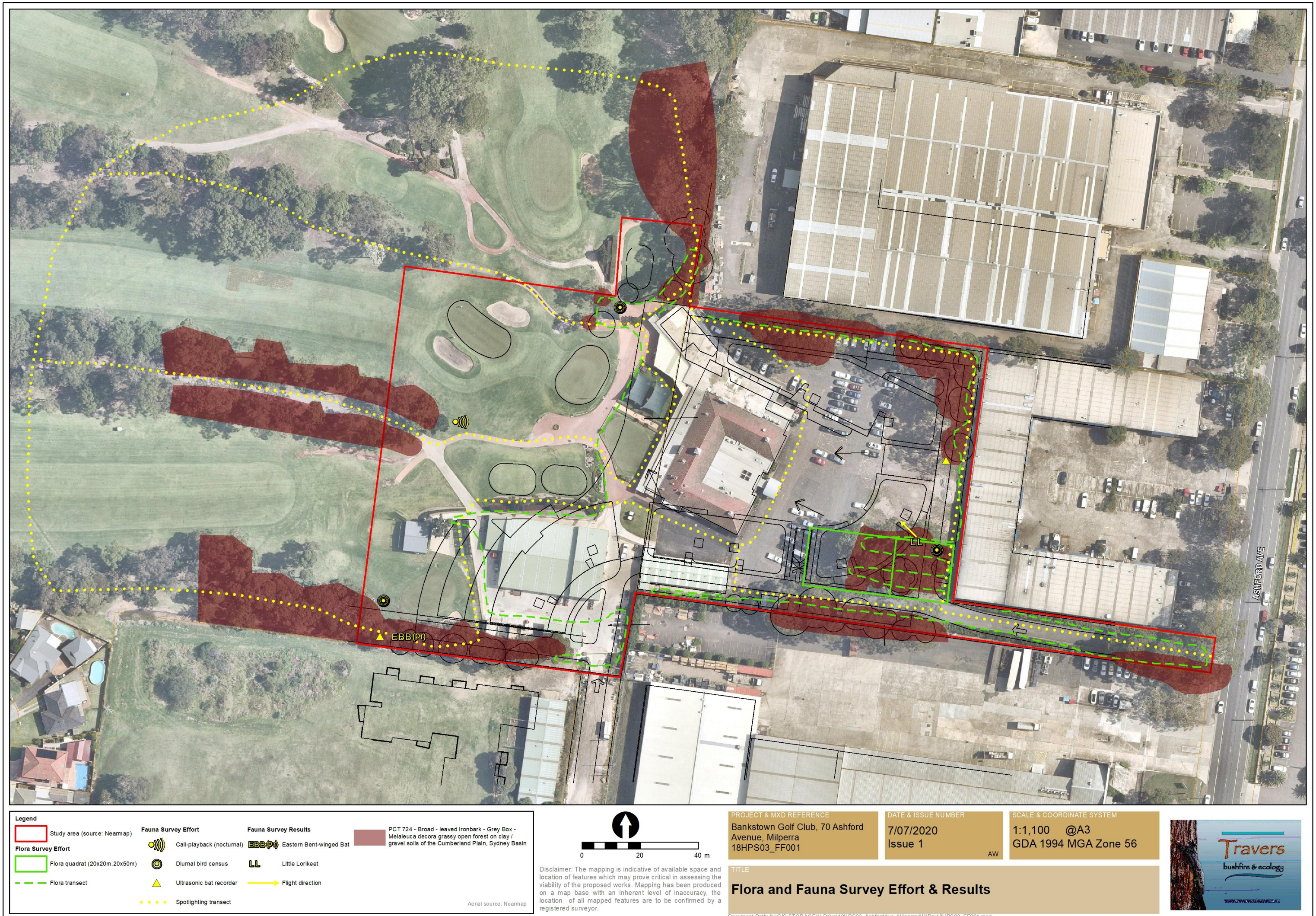


Figure 6 – Flora & fauna survey effort & results

3.7 Connectivity

The vegetation within the study area consists of *Broad-leaved Ironbark – Grey Box – Melaleuca decora* grassy open forest on clay/gravel soils of the Cumberland Plain. It is bordered to the north, east and south by industrial lots. The site is fragmented to the west by the Bankstown Golf Club buildings. However, beyond this limited connectivity is evident on the golf course through small strips of remnant trees which border the grounds and foot paths throughout.

This provides passage for birds from the study area through the golf course which extends to patches of riparian vegetation of the Georges River. To the east, little connectivity is present for birds with planted shrubs lining the driveway and remnant roadside trees along Ashmore Road but does not extend beyond this.

The vegetation onsite is already fragmented from the surrounding landscape. The study area provides no local or regionally important connective values to warrant protection but will remain relatively unchanged in the post development landscape. The study areas contribution to local connectivity is shown in Figure 7 below.



Figure 7 – Local connectivity



Watercourses GDE's & Wetlands

4

4.1 Endangered wetland communities

A number of wetland communities have been listed as an 'endangered ecological community' under the NSW *BC Act*. Impacts on wetland communities must be assessed under the *BC Act* and if present the management of wetland communities must be given due consideration in accordance with the objectives and principles of management as contained within the NSW Wetlands Policy (2010), and appropriate management as determined by NSW DPIE - Office of Water in their general terms of approval (GTA's).

No endangered wetland communities were present within the study area and therefore a referral to NRAR is not required for impacts on waterfront land.



Figure 8 – Coastal wetlands - State Environmental Planning Policy (Coastal Management) 2018

4.2 Groundwater dependent ecosystems (GDEs)

Groundwater dependent ecosystems are communities of plants, animals and other organisms whose extent and life processes are dependent on groundwater. Groundwater Dependent Ecosystems (GDEs) were not observed within the study area and therefore the policy does not require any further consideration. A referral to NRAR is not required for impacts on waterfront land.

4.3 Watercourses

The proposed development will not impact on watercourses or drainage lines (Figure 9). A referral to NRAR is not required for impacts on waterfront land.

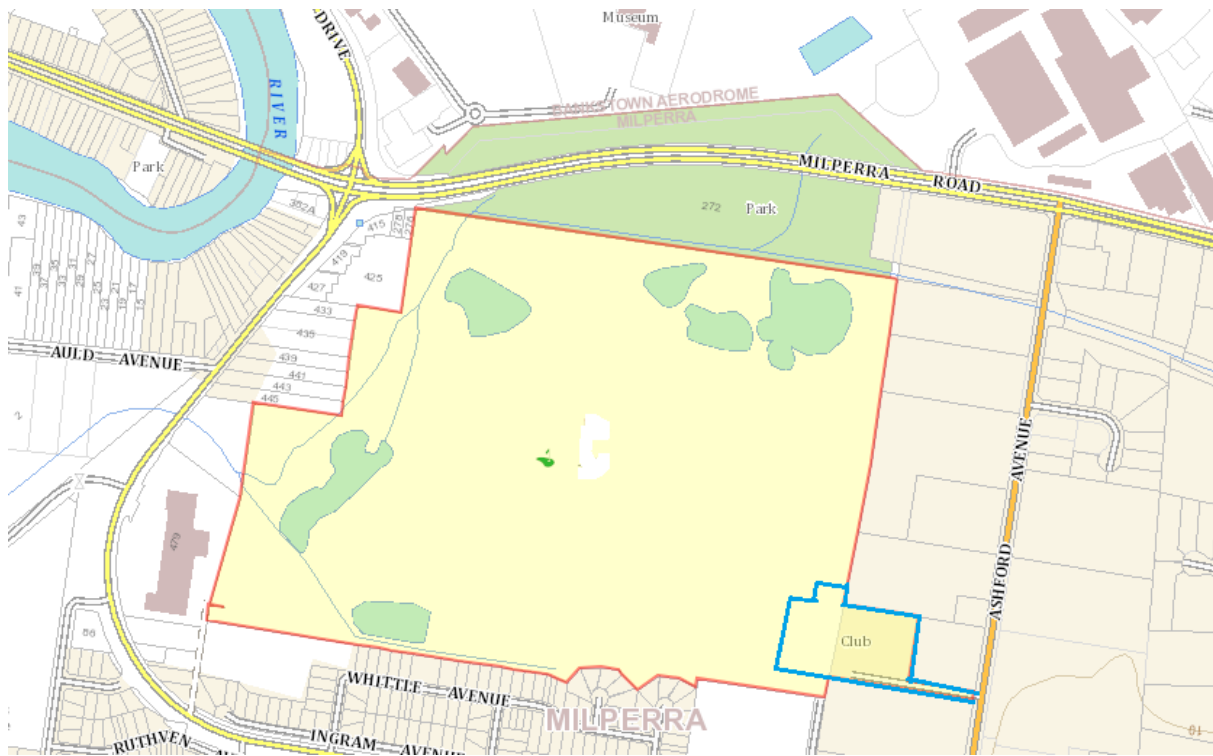


Figure 9 – Watercourses and drainage lines

(Source: Six Maps – July 2020)



Biodiversity Impact Assessment

5

5.1 Biodiversity Offsets Scheme (BOS)

The *BC Act* repeals the *Threatened Species Conservation Act 1995*, the *Nature Conservation Trust Act 2001* and the animal and plant provisions of the *National Parks and Wildlife Act 1974*. Together with the [Biodiversity Conservation Regulation 2017](#), the *BC Act* establishes a new regulatory framework for assessing and offsetting biodiversity impacts on proposed developments and clearing. It establishes a framework to avoid, minimise and offset impacts on biodiversity from development through the Biodiversity Offsets Scheme (BOS).

Where development consent is granted, the authority may impose as a condition of consent an obligation to retire a number and type of biodiversity credits determined under the new Biodiversity Assessment Method (BAM).

The Biodiversity Offsets Scheme applies to:

- local development (assessed under Part 4 of the *Environmental Planning and Assessment Act 1979*) that triggers the Biodiversity Offsets Scheme Threshold or is likely to significantly affect threatened species based on the test of significance in section 7.3 of the *Biodiversity Conservation Act 2016*
- state significant development and state significant infrastructure projects, unless the Secretary of the Department of Planning, Industry and Environment and the environment agency head determine that the project is not likely to have a significant impact
- biodiversity certification proposals
- clearing of native vegetation in urban areas and areas zoned for environmental conservation that exceeds the Biodiversity Offsets Scheme threshold and does not require development consent
- clearing of native vegetation that requires approval by the Native Vegetation Panel under the *Local Land Services Act 2013*
- activities assessed and determined under Part 5 of the *Environmental Planning and Assessment Act 1979* (generally, proposals by government entities) if proponents choose to 'opt in' to the Scheme.

Proponents will need to supply evidence relating to the triggers for the Biodiversity Offsets Scheme Threshold and the test of significance (where relevant) when submitting their application to the consent authority.

5.2 Biodiversity Offset Scheme Threshold assessment

The BOS includes two (2) elements to the threshold test – an area trigger and a Biodiversity Values Land Map trigger. If clearing exceeds either trigger, the BOS applies to the proposed clearing.

5.2.1 Biodiversity Values Land Map

Biodiversity Values Land has not been mapped within the study area – an offset is not required under this trigger. Figure 10 below shows the site (blue) in relation to those areas (coloured mauve) as having biodiversity values.

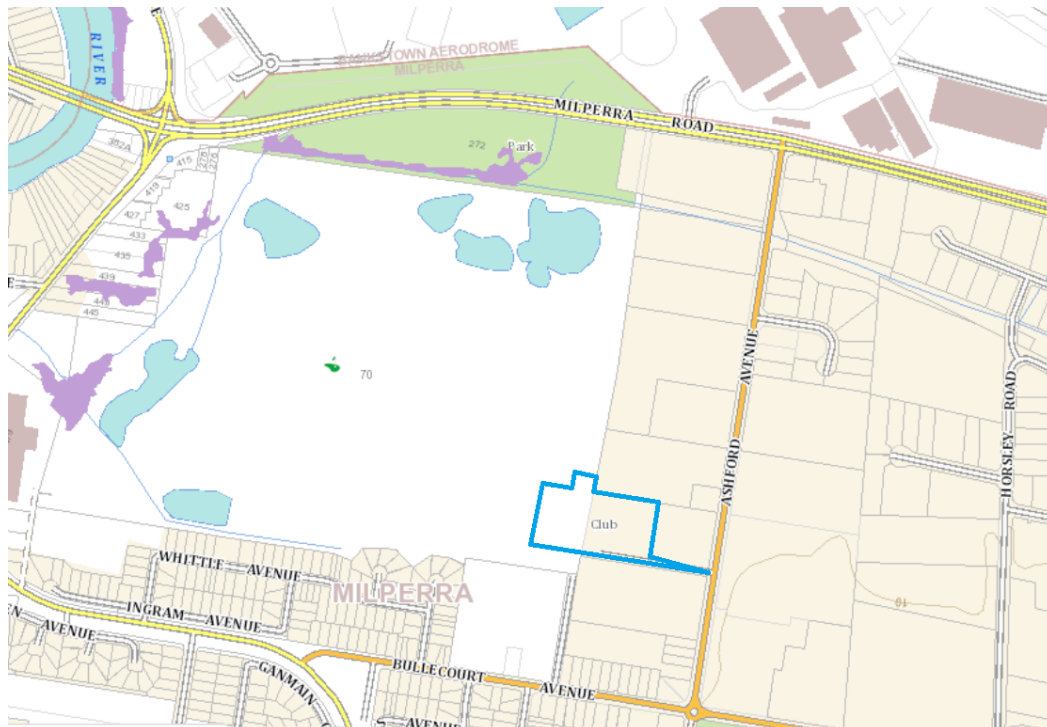


Figure 10 - Biodiversity values land (mauve shading) in the local area

(Source: DPIE – Biodiversity Values Map – July 2020)

5.2.2 Area clearing threshold

The area threshold varies depending on the minimum lot size (shown in the Lot Size Maps made under the relevant Local Environmental Plan (LEP)), or actual lot size (where there is no minimum lot size provided for the relevant land under the LEP).

Table 3 – BOS Entry Threshold Report

Results Summary

Date of Calculation	07/07/2020 4:20 PM	BDAR Required*
Total Digitised Area	0.46 ha	
Minimum Lot Size Method	Lot size	
Minimum Lot Size	1.18 ha	
Area Clearing Threshold	0.5 ha	
Area clearing trigger Area of native vegetation cleared	Unknown #	Unknown #
Biodiversity values map trigger Impact on biodiversity values map(not including values added within the last 90 days)?	no	no
Date of the 90 day Expiry	N/A	

Table 3 identifies that the BOS entry threshold report has determined the area threshold based on the minimum lot size of 1.18 ha, and the area clearing threshold for which the BOS applies is 0.5 ha. Clearing of 'native vegetation' that exceeds 0.5 ha will require a biodiversity

offset to be obtained. Note that 'native vegetation' includes planted native species. The development proposal will not impact more than threshold therefore offsetting will not be required under this trigger.

5.3 Serious and irreversible impacts on biodiversity values

Development consent cannot be granted for non-State significant development under Part 4 of the *Environmental Planning and Assessment Act 1979* (NSW) if the consent authority is of the opinion it is likely to have serious and irreversible impacts (SAIL) on biodiversity values. The determination of SAIL is to be made in accordance with principles prescribed section 6.7 of the *BC Regulation* (2017).

Candidate SAIL species with considered potential to occur are listed in Table 4.

Table 4 – Candidate SAIL species with potential habitat

Common name	BC Act	EPBC Act	Potential to occur
Little Bent-winged Bat	V	-	✓
Large Bent-winged Bat	V	-	✓
Large-eared Pied Bat	V	V	low
Eastern Cave Bat	V	-	unlikely

The additional impact assessment provisions for threatened species are outlined under Section 10.2.3 of the BAM (2017) and have been applied to the recorded Large Bent-winged Bat within Appendix 4. As a result of this assessment it is considered that the proposal will not likely cause a serious or irreversible impact on this microbat species or other candidate fauna species considered.

Shale Gravel Transition Forest is not a candidate SAIL community.

5.4 Potential ecological impacts

The direct, indirect and cumulative ecological impacts have been considered in respect to recorded biodiversity, threatening processes and extent of impact as a result of the proposed works:

5.4.1 BC Reg Prescribed impacts

The following potential impacts on biodiversity values as a result of the proposal are prescribed (subject to subclause (2) of the *BC Reg*) as biodiversity impacts to be assessed under the biodiversity offsets scheme:

- Human made structures,
- Non-native vegetation.

The human-made structures on site are unlikely to house threatened fauna species such as microbats due to a lack of suitable cavities and lighting being used.

The non-native vegetation is largely low-growing shrubbery as shown in Photo 5, 6 and 7. Due to the location of these landscaped garden beds in areas of high public access, noise and lighting, they discourage use by a lot of fauna. They provide very little in the way of connectivity value and are proposed to be replaced by other landscaping once the new buildings are developed. If the recommendations of the report are enacted, this should provide a better

outcome as we propose that the majority of landscaping utilises native species of Shale Gravel Transition Forest origin.

5.4.2 Direct impacts

The direct impacts of the proposal within the development footprint are considered as:

- Removal or modification of up to 0.195 ha of remnant native trees and very poor understorey native vegetation commensurate with Shale Gravel Transition Forest,
- Removal of seasonal foraging myrtaceous trees,
- Further fragmentation and / or isolation of small native vegetation remnants.

5.4.3 Indirect impacts

The potential indirect impacts of the proposal are considered as:

- Additional shading on remnant vegetation from proposed taller buildings,
- Potential for increased soil nutrients from fertilisers used in landscaping,
- Reduced cross-site movements by small bird species such as passerines.

Replacement planting should consider suitable plants that prefer more shaded locations but where possible, utilising a high proportion of species from Shale Gravel Transition Forest.

Fertiliser usage should be kept to a minimum, or utilise types that sit in the soil rather than on top.

Cross-site movements may be enhanced through strategic planting placement and limiting bright lighting in landscaped areas.

5.4.4 Cumulative impacts

The potential cumulative impacts (combined results of past, current and future activities) of the proposal are considered as:

- Cumulative loss of native vegetation within the local area,
- Increased risk of weed invasion and fungal mobilisation or infections,
- Cumulative loss of foraging habitat for native fauna,
- Increased varied human presence and activity within the remaining natural habitat areas of the adjacent bushland remnant, and
- Further fragmentation / isolation of small remnant of vegetation.

5.5 Avoidance actions

Whilst the proposal is of a small-scale and will cause limited impacts, avoidance actions are warranted to reduce impacts upon the EEC Shale Gravel Transition Forest.

The proponent has avoided most of the trees around the perimeter of the site to reduce impacts on EEC Shale Gravel Transition Forest.

The existing EEC vegetation is currently APZ compliant and no further trees are required to be removed for the purposes of an asset protection zone. The understorey will continue to be impacted by maintenance of the existing landscape for asset protection zones under the existing canopy

By measuring impacts to the remnant vegetation and habitat, we have taken a precautionary approach and advised an estimated 0.195 ha to be impacted. This will be largely due to the understorey being mown or slashed regularly as opposed to large-scale tree removal.

As the remnant vegetation is largely on the perimeter of the site (northern and southern boundaries, the development has been sited primarily upon the existing club house and car parking facilities to ensure that impacts are minimal.

5.6 Mitigation measures

The existing stand of native trees can be improved through careful management of the existing understorey by the following measures

- Fencing of remnants to exclude cars from the tree protection zones.
- Selective bed and understorey planting compliant with APZ standards to enhance the ecological diversity of the existing native canopy vegetation.
- Remnant trees are to adhere to the Arborist Report's recommendations (tree protection zones / fencing, etc).
- Landscaping within the property is to primarily utilise locally occurring native species commensurate the existing vegetation. At least 50% of plantings should utilise species that naturally occur within the Shale Gravel Transition Forest EEC.
- Weed control is to be undertaken to suppress the growth of invasive species and to gradually replace exotic species with those recommended in (b).
- Standard *Phytophthora cinnamomi* protocol applies to the cleaning of all plant, equipment, hand tools and work boots prior to delivery onsite to ensure that there is no loose soil or vegetation material caught under or on the equipment and within the tread of vehicle tyres. Any equipment onsite found to contain soil or vegetation material is to be cleaned in a quarantined work area or wash station and treated with anti-fungal herbicides.



Conclusions

6

Ecological survey and assessment have been undertaken in accordance with relevant legislation including the *Environmental Planning and Assessment Act 1979*, the *Biodiversity Conservation Act 2016*, the commonwealth *Environment Protection and Biodiversity Conservation Act 1999* and the *Fisheries Management Act 1994*.

In respect of matters required to be considered under the *Environmental Planning and Assessment Act 1979* and relating to the species / provisions of the *Biodiversity Conservation Act 2016*, two (2) threatened fauna species Little Lorikeet (*Glossopsitta pusilla*) and Large Bent-winged Bat (*Miniopterus orianae oceanensis*), no threatened flora species, no endangered populations, and one TEC, *Shale Gravel Transition Forest* were recorded within the study area.

The state test of significance (Appendix 3) has concluded that the proposed development will not have a significant impact on any threatened species, populations or TECs. Therefore, (a) a Species Impact Statement is not required for the proposal and (b) biodiversity offsetting is not required.

Offsetting under the Biodiversity Offsets Scheme (BOS) is not required for the proposal as:

- The study area is not located on lands mapped as Biodiversity Values Land.
- The proposed clearing of 0.19ha of native vegetation is less than the area clearing threshold of 0.5ha.
- The test of significance concludes a not-significant impact on the relative entities being tested.

The proposal will also not cause any Serious or Irreversible Impacts (SII) on threatened biodiversity most at risk of extinction.

In respect of matters required to be considered under the *Environment Protection and Biodiversity Conservation Act 1999*, no threatened fauna species, no protected migratory bird species, no threatened flora species, and no TECs were recorded within the study area.

The proposal was not considered to have a significant impact on or be constrained by matters of national environmental significance. As such a referral to Department of Environment and Energy is not required.

In respect of matters relative to the *Fisheries Management Act 1994*, no suitable habitat for threatened marine or aquatic species was observed within the development footprint and there are no matters requiring further consideration under this Act.

Appendix 1

Flora & Fauna Species Lists

Table 5 – Flora species recorded (Appendix 1)

Family	Scientific name	Common name
TREES		
Lauraceae	<i>Cinnamomum camphora</i> *	Camphor Laurel
Eleocarpaceae	<i>Elaeocarpus reticulatus</i>	Blueberry Ash
Myrtaceae	<i>Eucalyptus moluccana</i> (*K)	Grey Box
Myrtaceae	<i>Eucalyptus sideroxylon</i> (*K)	Red Ironbark
Myrtaceae	<i>Eucalyptus tereticornis</i> (*K)	Forest Red Gum
Moraceae	<i>Ficus</i> spp.*	-
Anacardiaceae	<i>Harpephyllum caffrum</i> *	-
Myrtaceae	<i>Melaleuca decora</i>	-
Myrtaceae	<i>Melaleuca quinquenervia</i> (*K)	Broad-leaved Paperbark
Myrtaceae	<i>Melaleuca styphelioides</i>	Prickly-leaved Tea Tree
Rosaceae	<i>Photinia serratifolia</i> *	Hawthorn
SHRUBS		
Buxaceae	<i>Buxus microphylla</i> *	Japanese Box
Myrtaceae	<i>Callistemon viminalis</i>	Weeping Bottlebrush
Theaceae	<i>Camellia sasanqua</i> *	Sasanqua Camellia
Asteliaceae	<i>Cordyline stricta</i>	Narrow-leaf Palm Lily
Rubiaceae	<i>Gardenia floribunda</i> *	-
GROUNDCOVERS		
Alliaceae	<i>Agapanthus praecox</i> subsp. <i>orientalis</i> *	-
Amaranthaceae	<i>Alternanthera pungens</i> *	Khaki Weed
Asteraceae	<i>Ambrosia artemisiifolia</i> *	Annual Ragweed
Asteraceae	<i>Bidens pilosa</i> *	Cobbler's Pegs
Cyperaceae	<i>Carex appressa</i>	Tall Sedge
Poaceae	<i>Cenchrus clandestinus</i> *	Kikuyu, Kikuyu Grass
Carophyllaceae	<i>Cerastium glomeratum</i> *	Mouse-ear Chickweed
Poaceae	<i>Chloris truncata</i>	Windmill Grass
Commelinaceae	<i>Commelina cyanea</i>	Scurvy Weed, Native Wandering Jew
Asteraceae	<i>Conyza bonariensis</i> *	Flax-leaf Fleabane
Asteraceae	<i>Cymbonotus lawsonianus</i>	Bears-ear
Poaceae	<i>Cynodon dactylon</i>	Common Couch
Cyperaceae	<i>Cyperus gracilis</i>	Slender Flat Sedge
Convolvulaceae	<i>Dichondra repens</i>	Kidney Weed
Iridaceae	<i>Dietes grandiflora</i> *	Fortnight Lily
Doryanthaceae	<i>Doryanthes excelsa</i>	Gymea Lily
Poaceae	<i>Ehrharta erecta</i> *	Panic Veldtgrass
Chenopodiaceae	<i>Einadia trigonos</i>	Fishweed
Poaceae	<i>Eleusine tristachya</i> *	Goose Grass
Euphorbiaceae	<i>Euphorbia peplus</i> *	Spurge
Asteraceae	<i>Hypochaeris radicata</i> *	Flatweed
Brassicaceae	<i>Lepidium africanum</i>	Common Peppergrass
Lomandraceae	<i>Lomandra longifolia</i>	Spiky-headed Mat-rush
Malvaceae	<i>Malva sylvestris</i> *	Tall Mallow
Poaceae	<i>Microlaena stipoides</i> var. <i>stipoides</i>	Weeping Rice Grass
Malvaceae	<i>Modiola caroliniana</i> *	Red-flowered Mallow
Nandinaceae	<i>Nandina domestica</i> *	Japanese Sacred Bamboo

Family	Scientific name	Common name
Oxalidaceae	<i>Oxalis corniculata</i> subsp. <i>corniculata</i> *	Sorrel
Poaceae	<i>Paspalum dilatatum</i> *	Paspalum
Araceae	<i>Philodendron bipinnatifidum</i> *	Philodendron
Plantaginaceae	<i>Plantago lanceolata</i> *	Ribwort
Poaceae	<i>Poa annua</i> *	Winter Grass
Poaceae	<i>Rytidosperma tenuius</i> syn. <i>Austrodanthonia tenuior</i>	Wallaby Grass
Asteraceae	<i>Senecio madagascariensis</i> *	Fireweed
Poaceae	<i>Setaria parviflora</i> *	-
Malvaceae	<i>Sida rhombifolia</i> *	Paddy's Lucerne
Solanaceae	<i>Solanum nigrum</i> *	Black Nightshade, Black-berry Nightshade
Asteraceae	<i>Soliva sessilis</i> *	Bindii
Asteraceae	<i>Sonchus oleraceus</i> *	Common Sow-thistle
Asteraceae	<i>Tagetes minuta</i> *	Stinking Roger
Fabaceae/faboideae	<i>Trifolium repens</i> *	White Clover
Scrophulariaceae	<i>Verbascum virgatum</i> *	Twiggy Mullein
Zamiaceae	<i>Zamia</i> sp. (<i>furfurcea</i> ?)	-
VINES		
Asclepiadaceae	<i>Araujia sericifera</i> *	Mothvine
Chenopodiaceae	<i>Einadia nutans</i> subsp. <i>linifolia</i>	Climbing Saltbush
Fabaceae/faboideae	<i>Glycine clandestina</i>	Twining Glycine
* denotes exotic species TS denotes threatened species (*K) denotes Koala feed tree species		

It should be noted that not all garden, cultivar or landscape species have been identified as part of this assessment.

Table 6 – Fauna species recorded (Appendix 1)

Common name	Scientific name	Method observed
Birds		June 22nd
Australian Magpie	<i>Cracticus tibicen</i>	OW
Australian Raven	<i>Corvus coronoides</i>	OW
Australian White Ibis	<i>Threskiornis molucca</i>	O
Australian Wood Duck	<i>Chenonetta jubata</i>	O
Crested Pigeon	<i>Ocyphaps lophotes</i>	W
Galah	<i>Eolophus roseicapillus</i>	OW
Little Lorikeet ^{TS}	<i>Glossopsitta pusilla</i>	W ^{PO}
Magpie-lark	<i>Grallina cyanoleuca</i>	O
Masked Lapwing	<i>Vanellus miles</i>	OW
Musk Lorikeet	<i>Glossopsitta concinna</i>	OW
Nankeen Kestrel	<i>Falco cenchroides</i>	O
Noisy Miner	<i>Manorina melanocephala</i>	OW
Pied Currawong	<i>Strepera graculina</i>	O
Rainbow Lorikeet	<i>Trichoglossus haematodus</i>	OW
Scaly-breasted Lorikeet	<i>Trichoglossus chlorolepidotus</i>	OW
Sulphur Crested Cockatoo	<i>Cacatua galerita</i>	OW
Welcome Swallow	<i>Hirundo neoxena</i>	O
Mammals		
Large Bent-winged Bat ^{TS}	<i>Miniopterus orianae oceanensis</i>	U ^{PR}
Gould's Wattled Bat	<i>Chalinolobus gouldii</i>	U ^{PO}
Amphibians		
Common Eastern Froglet	<i>Crinia signifera</i>	W
<p>Note: * indicates introduced species ^{TS} indicates threatened species ^{MS} indicates Migratory species</p> <p>All species listed are identified to a high level of certainty unless otherwise noted as:</p> <p>^{PR} indicates species identified to a 'probable' level of certainty – more likely than not ^{PO} indicates species identified to a 'possible' level of certainty – low-moderate level of confidence</p>		
E - Nest/roost	H - Hair/feathers/skin	P - Scat
F - Tracks/scratchings	K - Dead	Q - Camera
FB - Burrow	O - Observed	T - Trapped/netted
G - Crushed cones	OW - Obs & heard call	U - Anabat/ultrasound
		W - Heard call
		X - In scat
		Y - Bone/teeth/shell
		Z - In raptor/owl pellet

Appendix 2

Threatened Flora & Fauna Habitat Assessment

Table 7 – Threatened flora species habitat assessment (Appendix 2)

Scientific name DATABASE SOURCE1	BC Act	EPBC Act	Growth form and habitat requirements <i>Distribution limit</i>	Recorded on site (✓)	If not recorded on site				Considered in test of significance (✓) Refer to Appendix 3
					Suitable habitat present (✓)	Nearby and / or high number of record(s) (✓) <i>Notes 1,2 & 3</i>	Record(s) from recent years (✓) <i>Notes 1,2 & 3</i>	Potential to occur	
<i>Acacia bynoeana</i> DPIE EPBC	E1	V	Erect or spreading shrub to 0.3m high growing in heath and dry sclerophyll open forest on sandy soils. Often associated with disturbed areas such as roadsides. <i>Distribution limits N-Newcastle S-Berrima.</i>	x	x	-	-	x	x
<i>Acacia pubescens</i> DPIE EPBC	V	V	Spreading shrub 1-4m high open sclerophyll growing in open forest and woodlands on clay soils. <i>Distribution limits N-Bilpin S-Georges River.</i>	x	✓	On western side of golf course	✓	Site is too degraded	x
<i>Allocasuarina glareicola</i> DPIE EPBC	E1	E	Small shrub 1-2m high growing in open sclerophyll forest on lateritic soils derived from tertiary alluviums. <i>Distribution limits Castlereagh NR region.</i>	x	x	-	-	x	x
<i>Caesia parviflora</i> var. <i>minor</i> DPIE	E1	-	Small tufted plant usually <20cm high. Grows in heath and woodland on sandstone derived soil, chiefly north coast, Central Tablelands & Central western Slopes. <i>Distribution limits N-Corindi S-Albury.</i>	x	x	-	-	x	x
<i>Caladenia tessellata</i> DPIE EPBC	E1	V	Terrestrial orchid. Clay-loam or sandy soils. LHCCREMS guidelines suggest the species grows in Map Unit 34 – Coastal Sand Wallum Woodland - Heath. Flowers in September – November. <i>Distribution limits N-Swansea S-south of Eden.</i>	x	x	-	-	x	x
<i>Callistemon linearifolius</i> DPIE	V	-	Shrub to 4m high. Dry sclerophyll forest on coast and adjacent ranges. <i>Distribution limits N-Nelson Bay S-Georges River.</i>	x	x	-	-	x	x
<i>Cryptostylis hunteriana</i> DPIE EPBC	V	V	Saprophytic orchid. Grows in swamp heath on sandy soils. <i>Distribution limits N-Gibraltar Range S-south of Eden.</i>	x	x	-	-	x	x

Scientific name DATABASE SOURCE1	BC Act	EPBC Act	Growth form and habitat requirements Distribution limit	Recorded on site (✓)	If not recorded on site				Considered in test of significance (✓) Refer to Appendix 3
					Suitable habitat present (✓)	Nearby and / or high number of record(s) (✓) Notes 1,2 & 3	Record(s) from recent years (✓) Notes 1,2 & 3	Potential to occur	
<i>Cynanchum elegans</i> DPIE EPBC	E1	E	Climber or twiner to 1m. Grows in rainforest gullies, scrub & scree slopes. <i>Distribution limits N-Gloucester S-Wollongong.</i>	x	x	-	-	x	x
<i>Darwinia biflora</i> DPIE EPBC	V	V	Erect or spreading shrub to 0.8m high. Grows in heath or understorey of woodland on or near shale-capped ridges underlain by Hawkesbury sandstone. <i>Distribution limits N-Gosford S-Cheltenham.</i>	x	x	-	-	x	x
<i>Deyeuxia appressa</i> DPIE EPBC	E1	E	Erect grass to 0.9m high. Grows on wet ground. <i>Distribution limits N-Hornsby S-Bankstown.</i>	x	x	-	-	x	x
<i>Diuris aequalis</i> DPIE EPBC	E1	V	Terrestrial orchid which occurs in montane Eucalypt forest with grassy-heathy understorey. Very rare apart from Boyd Plateau. <i>Distribution limits N-Blue Mountains S-Braidwood.</i>	x	x	-	-	x	x
<i>Epacris purpurascens</i> var. <i>purpurascens</i> DPIE	V	-	Erect shrub to 1.5m high growing in sclerophyll forest and scrub and near creeks and swamps on sandstone. <i>Distribution limits N-Gosford S-Blue Mountains.</i>	x	x	-	-	x	x
<i>Eucalyptus camfieldii</i> DPIE EPBC	V	V	Stringybark to 10m high. Grows on coastal shrub heath and woodlands on sandy soils derived from alluviums and Hawkesbury sandstone. <i>Distribution limits N-Norah Head S-Royal NP.</i>	x	x	-	-	x	x
<i>Eucalyptus nicholii</i> DPIE	V	-	This species is widely planted as an urban street tree and in gardens but is quite rare in the wild. <i>It is confined to the New England Tablelands of NSW, where it occurs from Nundle to north of Tenterfield, largely on private property.</i>	x	x	-	-	x	x
<i>Eucalyptus scoparia</i> DPIE EPBC	E1	V	Smooth-barked tree only known from vicinity of Bald Rock.	x	x	-	-	x	x

Scientific name DATABASE SOURCE1	BC Act	EPBC Act	Growth form and habitat requirements <i>Distribution limit</i>	Recorded on site (✓)	If not recorded on site				Considered in test of significance (✓) Refer to Appendix 3
					Suitable habitat present (✓)	Nearby and / or high number of record(s) (✓) <i>Notes 1,2 & 3</i>	Record(s) from recent years (✓) <i>Notes 1,2 & 3</i>	Potential to occur	
<i>Genoplesium baueri</i> DPIE EPBC	E1	E	A terrestrial orchid that grows in sparse sclerophyll forest and moss gardens over sandstone. Flowers Feb–Mar. <i>Distribution limits N – Hunter Valley S – Nowra.</i>	x	x	-	-	x	x
<i>Grammitis stenophylla</i> DPIE	E1	-	A small lithophytic fern with fronds generally <5cm. <i>Occurs in rainforest and wet sclerophyll forest in the coastal divisions of NSW. Usually grown on rocks.</i>	x	x	-	-	x	x
<i>Grevillea beadleana</i> DPIE	E1	E	A spreading shrub known from Northern NSW at high altitudes.	x	x	-	-	x	x
<i>Grevillea parviflora</i> subsp. <i>parviflora</i> DPIE EPBC	V	V	Open to erect shrub to 1m. Grows in woodland on light clayey soils. <i>Distribution limits N-Cessnock S-Appin.</i>	x	x	-	-	x	x
<i>Gyrostemon thesioides</i> DPIE	E1	-	Multi-stemmed shrub to 70cm. Grows on hillsides and riverbanks. <i>Confined to Georges and Nepean Rivers and believed extinct.</i>	x	x	-	-	x	x
<i>Hibbertia fumana</i> DPIE	E4A	-	Shrublet with a distribution from Richmond to Mittagong, mostly found near the intergrade between Castlereagh Scribbly Gum Woodland and Castlereagh Ironbark Forest as well as aeolian deposits	x	x	-	-	x	x
<i>Hibbertia puberula</i> DPIE	E1	-	Shrublets with branches up to 30cm long. It favours dry sclerophyll woodland or low heath on sandy soils or rarely in clay, with or without rocks underneath. <i>It extends from Wollemi National Park south to Morton National Park and the south coast near Nowra. Early records are from Hawkesbury River area in Sydney and the Blue Mountains.</i>	x	x	-	-	x	x

Scientific name DATABASE SOURCE1	BC Act	EPBC Act	Growth form and habitat requirements Distribution limit	Recorded on site (✓)	If not recorded on site				Considered in test of significance (✓) Refer to Appendix 3
					Suitable habitat present (✓)	Nearby and / or high number of record(s) (✓) Notes 1,2 & 3	Record(s) from recent years (✓) Notes 1,2 & 3	Potential to occur	
<i>Hibbertia</i> sp. Bankstown (<i>Hibbertia puberula</i> subsp. <i>glabrescens</i>) DPIE EPBC	E4A	CE	Small prostate shrub known only from Bankstown airport. Occurs on tertiary alluvium floodplain communities of the Georges River. Flowers Oct-early Dec.	x	x	-	-	x	x
<i>Hibbertia stricta</i> subsp. <i>furcatula</i> (<i>Hibbertia</i> sp. Menai) DPIE	E1	-	Small shrub 0.8-1.3m tall. Flowers from Jul-Dec. Grows in Dry Sclerophyll Forest and woodland over sandstone. Known from one population along the Woronora River gorge area and one population near Nowra.	x	x	-	-	x	x
<i>Leucopogon exolasius</i> DPIE EPBC	V	V	Erect shrub to 2m high. Rocky hillsides and creek banks in Sydney Sandstone Gully Forest. Confined to Woronora and Georges Rivers and Stokes Creek.	x	x	-	-	x	x
<i>Leucopogon fletcheri</i> subsp. <i>fletcheri</i> DPIE	E1	-	Shrub to 1.8m high growing in woodland on lateritic soils. Distribution limits N-St Albans S-Springwood.	x	x	-	-	x	x
<i>Melaleuca biconvexa</i> DPIE EPBC	V	V	Tall shrub. Grows in wetlands adjoining perennial streams and on the banks of those streams, generally within the geological series known as the Terrigal Formation. Distribution limits N-Port Macquarie S-Jervis Bay.	x	x	-	-	x	x
<i>Melaleuca deanei</i> DPIE EPBC	V	V	Shrub to 3m high. Grows in heath on sandstone. Distribution limits N-Gosford S-Nowra.	x	x	-	-	x	x
<i>Persicaria elatior</i> DPIE EPBC	V	V	Herb to 90cm tall which grows in damp places especially beside streams and lakes. Occasionally in swamp forest or associated with disturbance. Varied distribution from SE NSW to QLD.	x	x	-	-	x	x

Scientific name DATABASE SOURCE1	BC Act	EPBC Act	Growth form and habitat requirements Distribution limit	Recorded on site (✓)	If not recorded on site				Considered in test of significance (✓) Refer to Appendix 3
					Suitable habitat present (✓)	Nearby and / or high number of record(s) (✓) Notes 1,2 & 3	Record(s) from recent years (✓) Notes 1,2 & 3	Potential to occur	
<i>Persoonia acerosa</i> DPIE EPBC	V	V	Erect to spreading shrub. Grows in heath or dry sclerophyll forest on sandstone. <i>Distribution limits N-Bilpin S-Hill Top.</i>	x	x	-	-	x	x
<i>Persoonia hirsuta</i> DPIE EPBC	E1	E	Erect to decumbent shrub. Grows in dry sclerophyll forest and woodland on Hawkesbury sandstone with infrequent fire histories. <i>Distribution limits N-Glen Davis S-Hill Top.</i>	x	x	-	-	x	x
<i>Persoonia nutans</i> DPIE EPBC	E1	E	Erect to spreading shrub. Grows in dry sclerophyll forest and woodland on laterite and alluvial sands. <i>Distribution limits Cumberland Plain.</i>	x	x	-	-	x	x
<i>Pimelea curviflora</i> var. <i>curviflora</i> DPIE EPBC	V	V	Woody herb or sub-shrub to 0.2-1.2m high. Grows on Hawkesbury Sandstone near shale outcrops. <i>Distribution Sydney.</i>	x	x	-	-	x	x
<i>Pimelea spicata</i> DPIE EPBC	E1	E	Decumbent or erect shrub to 0.5m high. Occurs principally in woodland on soils derived from Wianamatta Shales. <i>Distribution limits N-Lansdowne S-Shellharbour.</i>	x	✓	2km north	✓	Site is too degraded	x
<i>Pomaderris brunnea</i> DPIE EPBC	V	V	Shrub to 3m high. <i>Confined to Upper Nepean and Colo Rivers where it grows in open forest.</i>	x	x	-	-	x	x
<i>Pterostylis gibbosa</i> DPIE EPBC	E1	E	Terrestrial orchid which occurs near Wollongong and in Hunter Valley in sclerophyll forest, sometimes with paperbarks.	x	x	-	-	x	x
<i>Pterostylis saxicola</i> DPIE EPBC	E1	E	Terrestrial orchid. Grows in shallow sandy soil above rock shelves, usually near Wianamatta / Hawkesbury transition. <i>Distribution limits N-Hawkesbury River S-Campbelltown.</i>	x	x	-	-	x	x

Scientific name DATABASE SOURCE1	BC Act	EPBC Act	Growth form and habitat requirements <i>Distribution limit</i>	Recorded on site (✓)	If not recorded on site				Considered in test of significance (✓) Refer to Appendix 3
					Suitable habitat present (✓)	Nearby and / or high number of record(s) (✓) <i>Notes 1,2 & 3</i>	Record(s) from recent years (✓) <i>Notes 1,2 & 3</i>	Potential to occur	
<i>Pultenaea aristata</i> DPIE EPBC	V	V	A small shrub, mostly 20-40cm tall. <i>Restricted to the Woronora Plateau, a small area between Helensburgh, south of Sydney, and Mt Kiera above Wollongong.</i> Occurs in either dry sclerophyll woodland or wet heath on sandstone. Flowers in winter and spring.	x	x	-	-	x	x
<i>Pultenaea parviflora</i> DPIE EPBC	E1	V	Erect shrub. Grows in dry sclerophyll forest at the intergrade between Tertiary Alluviums and Wianamatta Shales. <i>Distribution limits Cumberland Plain.</i>	x	x	-	-	x	x
<i>Pultenaea pedunculata</i> DPIE	E1	-	Prostrate shrub. Grows in dry sclerophyll forest and disturbed sites. <i>Confined to Prestons and Villawood in NSW.</i>	x	x	-	-	x	x
<i>Rhodamnia rubescens</i> DPIE	E4A	-	Shrub to small tree to 25m tall. Widespread in warmer rainforest and on rainforest margins on range of volcanically derived and sedimentary soils. Mainly coastal areas; north from Batemans Bay. Flowers late winter to spring.	x	x	-	-	x	x
<i>Syzygium paniculatum</i> DPIE EPBC	V	V	Small tree. Subtropical and littoral rainforest on sandy soil. <i>Distribution limits N-Forster S-Jervis Bay.</i>	x	x	-	-	x	x
<i>Thelymitra</i> sp. 'Kangaloon' (<i>Thelymitra kangaloonica</i>) DPIE EPBC	E4A	CE	A terrestrial orchid with dark blue flowers, presented in mid-late spring. <i>Only known from the Robertson area in the Southern Highlands.</i> Often in association with the endangered ecological community <i>Temperate Highland Peat Swamps on Sandstone.</i>	x	x	-	-	x	x
<i>Thesium australe</i> DPIE EPBC	V	V	Erect herb to 0.4m high. Root parasite. Themeda grassland or woodland often damp. <i>Distribution limits N-Tweed Heads S-south of Eden.</i>	x	x	-	-	x	x

<i>Scientific name</i> DATABASE SOURCE ¹	<i>BC Act</i>	<i>EPBC Act</i>	Growth form and habitat requirements <i>Distribution limit</i>	Recorded on site (✓)	If not recorded on site				Considered in test of significance (✓) Refer to Appendix 3
					Suitable habitat present (✓)	Nearby and / or high number of record(s) (✓) <i>Notes 1,2 & 3</i>	Record(s) from recent years (✓) <i>Notes 1,2 & 3</i>	Potential to occur	
<i>Wilsonia backhousei</i> DPIE	V	-	Perennial subshrub with procumbent branches. Grows in coastal saltmarshes. <i>Wilsonia backhousei</i> is salt tolerant and is found in intertidal saltmarshes and, more rarely, on seaciffs. In New South Wales <i>Wilsonia backhousei</i> is scattered along the coast, reaching a northern limit at Wamberal Lagoon. In the Sydney region there has been a considerable decline in the abundance of the species over the last 100yrs, largely as a result of loss of habitat. <i>Distribution limits N-Sydney S-South of Eden.</i>	X	X	-	-	X	X
DPIE	- Denotes species listed within 10km of the development footprint on the <i>Atlas of NSW Wildlife</i>								
EPBC	- Denotes species listed within 10km of the development footprint in the <i>EPBC Act</i> habitat search								
TBE	- Denotes additional species considered by <i>Travers bushfire & ecology</i> to have potential habitat based on regional knowledge and other records								
V	- Denotes vulnerable listed species under the relevant Act								
E or E1	- Denotes endangered listed species under the relevant Act								
E4A or CE	- Denotes critically endangered listed species under the relevant Act								
NOTE:	1. This field is not considered if no suitable habitat is present within the development footprint 2. ‘records’ refer to those provided by the <i>Atlas of NSW Wildlife</i> 3. ‘nearby’ or ‘recent’ records are species specific accounting for home range, dispersal ability and life cycle								

Table 8 – Threatened fauna species habitat assessment (Appendix 2)

Common name <i>Scientific name</i> <small>Database source</small>	BC Act	EPBC Act	Preferred habitat <i>Distribution limit</i>	Recorded on site (✓)	If not recorded on site				Considered in assessment of significance test (✓) Refer to Appendix 3
					Suitable habitat present (✓)	Nearby and/or high number of record(s) (✓) <small>Notes 1,2 & 3</small>	Record(s) from recent years (✓) <small>Notes 1,2 & 3</small>	Potential to occur	
Giant Burrowing Frog <i>Heleioporus australiacus</i> EPBC	V	V	Inhabits open forests and riparian forests along non-perennial streams, digging burrows into sandy creek banks. <i>Distribution limit: N-Near Singleton S-South of Eden.</i>	x	x	-	-	x	x
Stuttering Frog <i>Mixophyes balbus</i> EPBC	E	V	Terrestrial inhabitant of rainforest and wet sclerophyll forests. <i>Distribution limit: N-near Tenterfield S-South of Bombala.</i>	x	x	-	-	x	x
Red-crowned Toadlet <i>Pseudophryne australis</i> DPIE	V	-	Prefers sandstone areas, breeds in grass and debris beside non-perennial creeks or gutters. Individuals can also be found under logs and rocks in non-breeding periods. <i>Distribution limit: N-Pokolbin. S-near Wollongong.</i>	x	x	-	-	x	x
Green and Golden Bell Frog <i>Litoria aurea</i> DPIE EPBC	E	V	Prefers the edges of permanent water, streams, swamps, creeks, lagoons, farm dams and ornamental ponds. Often found under debris. <i>Distribution limit: N-Byron Bay S-South of Eden.</i>	x	x	-	-	x	x
Littlejohn's Tree Frog <i>Litoria littlejohnii</i> EPBC	V	V	Found in wet and dry sclerophyll forest associated with sandstone outcrops at altitudes 280-1,000m on eastern slopes of Great Dividing Range. Prefers flowing rocky streams. <i>Distribution limit: N-Hunter River S-Eden.</i>	x	x	-	-	x	x
Southern Bell Frog <i>Litoria raniformis</i> EPBC	E	V	Prefers the edges of permanent water, streams, swamps, creeks, lagoons, farm dams and ornamental ponds. Often found under debris. <i>Distribution limit: N-ACT Bay. S-Albury.</i>	x	x	-	-	x	x

Common name Scientific name Database source	BC Act	EPBC Act	Preferred habitat Distribution limit	Recorded on site (✓)	If not recorded on site				Considered in assessment of significance test (✓) Refer to Appendix 3
					Suitable habitat present (✓)	Nearby and/or high number of record(s) (✓) <i>Notes 1,2 & 3</i>	Record(s) from recent years (✓) <i>Notes 1,2 & 3</i>	Potential to occur	
Rosenberg's Goanna <i>Varanus rosenbergi</i> DPIE	V	-	Hawkesbury sandstone outcrop specialist. Inhabits woodlands, dry open forests and heathland sheltering in burrows, hollow logs, rock crevices and outcrops. <i>Distribution limit: N-Nr Broke. S-Nowra Located in scattered patches near Sydney, Nowra and Goulburn.</i>	x	x	-	-	x	x
Broad-headed Snake <i>Hoplocephalus bungaroides</i> EPBC	E	V	Sandstone outcrops, exfoliated rock slabs and tree hollows in coastal and near coastal areas. <i>Distribution limit: N-Mudgee Park. S-Nowra.</i>	x	x	-	-	x	x
Freckled Duck <i>Stictonetta naevosa</i> DPIE	V	-	Occurs mainly within the Murray-Darling basin and the channel country within large cool temperate to sub-tropical swamps, lakes and floodwaters with cumbungi, lignum or melaleucas. <i>Distribution limit: N- Tenterfield. S-Albury.</i>	x	x	-	-	x	x
Superb Fruit-dove <i>Ptilinopus superbus</i> DPIE	V	-	Rainforests, adjacent mangroves, eucalypt forests, scrubland with native fruits. <i>Distribution limit: N-Border Ranges National Park. S-Batemans Bay.</i>	x	x	-	-	x	x
White-throated Needletail ^{MS} <i>Hirundapus caudacutus</i> DPIE EPBC	-	V	Airspace over forests, woodlands, farmlands, plains, lakes, coasts, towns; companies often forage along favoured hilltops and timbered ranges. Breeds Siberia, Himalayas, east to Japan. Summer migrant to eastern Australia. <i>Distribution limit: N-Tweed Heads. S-South of Eden.</i>	x	x	-	-	x	x

Common name Scientific name Database source	BC Act	EPBC Act	Preferred habitat Distribution limit	Recorded on site (✓)	If not recorded on site				Considered in assessment of significance test (✓) Refer to Appendix 3
					Suitable habitat present (✓)	Nearby and/or high number of record(s) (✓) <i>Notes 1,2 & 3</i>	Record(s) from recent years (✓) <i>Notes 1,2 & 3</i>	Potential to occur	
Black-necked Stork <i>Ephippiorhynchus asiaticus</i> DPIE	E	-	Occurs in tropical to warm temperate terrestrial wetlands, estuarine and littoral habitats such as mangroves, tidal mudflats, floodplains, open woodlands, irrigated lands, bore drains, sub-artesian pools, farm dams and sewerage ponds. <i>Distribution limit: N-Tweed Heads. S-Nowra.</i>	x	x	-	-	x	x
Australasian Bittern <i>Botaurus poiciloptilus</i> DPIE EPBC	E	E	Found in or over water of shallow freshwater or brackish wetlands with tall reedbeds, sedges, rushes, cumbungi, lignum and also in ricefields, drains in tussocky paddocks, occasionally saltmarsh, brackish wetlands. <i>Distribution limit: N-North of Lismore. S- Eden.</i>	x	x	-	-	x	x
Black Bittern <i>Ixobrychus flavicollis</i> DPIE	V	-	Found in shadowy, leafy waterside trees such as callistemons, casuarinas, paperbarks, eucalypts, mangroves and willows along tidal creeks, freshwater and brackish streams and ponds, sheltered mudflats and oyster slats. <i>Distribution limit: N-Tweed Heads. S-South of Eden.</i>	x	x	-	-	x	x
Spotted Harrier <i>Circus assimilis</i> DPIE	V	-	Utilises grassy plains, crops and stubblefields; saltbush, spinifex associations; scrublands, mallee, heathlands; open grassy woodlands. <i>Distribution limit: N-Tweed Heads. S-South of Eden.</i>	x	Marginal	✓	X	Unlikely	✓
White-bellied Sea Eagle (<i>Haliaeetus leucogaster</i>) DPIE EPBC	V	-	Occupies coasts, islands, estuaries, inlets, large rivers, inland lakes and reservoirs. <i>Sedentary; dispersive. N-Tweed Heads. S-South of Eden.</i>	x	Marginal	✓	✓	Unlikely	✓
Little Eagle <i>Hieraaetus morphnoides</i> DPIE	V	-	Utilises plains, foothills, open forests, woodlands and scrublands; river red gums on watercourses and lakes. <i>Distribution limit - N-Tweed Heads. S-South of Eden.</i>	x	Sub-optimal	✓	✓	Low	✓

Common name Scientific name Database source	BC Act	EPBC Act	Preferred habitat Distribution limit	Recorded on site (✓)	If not recorded on site				Considered in assessment of significance test (✓) Refer to Appendix 3
					Suitable habitat present (✓)	Nearby and/or high number of record(s) (✓) <i>Notes 1,2 & 3</i>	Record(s) from recent years (✓) <i>Notes 1,2 & 3</i>	Potential to occur	
Square-tailed Kite <i>Lophoictinia isura</i> DPIE	V	-	Utilises mostly coastal and sub-coastal open forest, woodland or lightly timbered habitats and inland habitats along watercourses and mallee that are rich in passerine birds. <i>Distribution limit: N-Goondiwindi. S-South of Eden.</i>	x	Sub-optimal	✓	✓	Unlikely	✓
Eastern Osprey <i>Pandion cristatus</i> DPIE EPBC	V	-	Utilises waterbodies including coastal waters, inlets, lakes, estuaries and offshore islands with a dead tree for perching and feeding. <i>Distribution limit: N-Tweed Heads. S-South of Eden.</i>	x	Marginal	✓	X	Not likely	x
Black Falcon <i>Falco subniger</i> DPIE	V	-	Inhabits plains, grasslands, foothills, timbered watercourses, wetland environs, crops; occasionally over towns and cities. <i>N-Tweed Heads. S-South of Eden</i>	x	x	-	-	x	x
Bush Stone-curlew <i>Burhinus grallarius</i> DPIE	E	-	Utilises open forests and savannah woodlands, sometimes dune scrub, savannah and mangrove fringes. <i>Distribution limit: N-Border Ranges National Park. S-Near Nowra.</i>	x	Marginal	x	✓	Not likely	x
Australian Painted Snipe <i>Rostratula australis</i> DPIE EPBC	E	E	Most numerous within the Murray-Darling basin and inland Australia within marshes and freshwater wetlands with swampy vegetation. <i>Distribution limit: N-Tweed Heads. S-South of Eden.</i>	x	x	-	-	x	x
Gang-gang Cockatoo <i>Callocephalon fimbriatum</i> DPIE	V	-	Prefers wetter forests and woodlands from sea level to > 2,000m on the Great Dividing Range, timbered foothills and valleys, timbered watercourses, coastal scrubs, farmlands and suburban gardens. <i>Distribution limit: mid north coast of NSW to western Victoria.</i>	x	x	-	-	x	x

Common name Scientific name Database source	BC Act	EPBC Act	Preferred habitat Distribution limit	Recorded on site (✓)	If not recorded on site				Considered in assessment of significance test (✓) Refer to Appendix 3
					Suitable habitat present (✓)	Nearby and/or high number of record(s) (✓) <i>Notes 1,2 & 3</i>	Record(s) from recent years (✓) <i>Notes 1,2 & 3</i>	Potential to occur	
Glossy Black-Cockatoo <i>Calyptorhynchus lathami</i> DPIE	V	-	Open forests with <i>Allocasuarina</i> species and hollows for nesting. <i>Distribution limit: N-Tweed Heads. S-South of Eden.</i>	x	x	-	-	x	x
Major Mitchell's Cockatoo <i>Cacatua leadbeateri</i> DPIE	V	-	Commonly found within the arid interior of Australia within desert scrubs, open woodland, mallee, mulga, and callitris woodlands. <i>Distribution limit: N-Goodooga. S-Albury.</i>	x	x	-	-	x	x
Purple-crowned Lorikeet <i>Glossopsitta porphyrocephala</i> DPIE	V	-	Prefers eucalypt woodlands, drier forests on foothills, plains, roadside timber and timbered watercourses. Ranges widely through inland mallee when in blossom. <i>Distribution limit: E Victoria to S Western Australia. Riverina mallee areas of SW NSW and S of South Australia.</i>	x	x	-	-	x	x
Little Lorikeet <i>Glossopsitta pusilla</i> DPIE	V	-	Inhabits forests, woodlands; large trees in open country; timbered watercourses, shelterbeds, and street trees. <i>Distribution limit: N-Tweed Heads. S-South of Eden.</i>	✓	-	-	-	Recorded	✓
Swift Parrot <i>Lathamus discolor</i> DPIE EPBC	E	E	Inhabits eucalypt forests and woodlands with winter flowering eucalypts. <i>Distribution limit: N-Border Ranges National Park. S-South of Eden.</i>	x	Marginal	✓	✓	Unlikely	✓
Orange-bellied Parrot <i>Neophema chrysogaster</i> EPBC	E	E	Favours small islands, peninsulas in coastal areas; with saltmarsh plants; coastal pastures, golf courses; crops of millet and sunflowers; dunes, beaches. <i>Distribution limit: N-Southern Sydney coast. S-South of Eden.</i>	x	x	-	-	x	x

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					Suitable habitat present (✓)	Nearby and/or high number of record(s) (✓) Notes 1,2 & 3	Record(s) from recent years (✓) Notes 1,2 & 3	Potential to occur	
Turquoise Parrot <i>Neophema pulchella</i> DPIE	V	-	Inhabits coastal scrubland, open forest and timbered grassland, especially ecotones between dry hardwood forests and grasslands. <i>Distribution limit: N-Near Tenterfield. S-South of Eden.</i>	x	x	-	-	x	x
Barking Owl <i>Ninox connivens</i> DPIE	V	-	Inhabits principally woodlands but also open forests and partially cleared land and utilises hollows for nesting. <i>Distribution limit: N-Border Ranges National Park. S-Eden.</i>	x	x	-	-	x	x
Powerful Owl <i>Ninox strenua</i> DPIE	V	-	Forests containing mature trees for shelter or breeding and densely vegetated gullies for roosting. <i>Distribution limits: N-Border Ranges National Park. S-Eden.</i>	x	Marginal	✓	✓	Unlikely	✓
Eastern Grass Owl <i>Tyto longimembris</i> DPIE	V	-	Inhabits grassland, coastal heath and lignum swamps, sheltering in dense grass tussocks by day. <i>Distribution limit: N-Tweed Heads. S-Lithgow.</i>	x	x	-	-	x	x
Masked Owl <i>Tyto novaehollandiae</i> DPIE	V	-	Open forest and woodlands with cleared areas for hunting and hollow trees or dense vegetation for roosting. <i>Distribution limit: N-Border Ranges National Park. S-Eden.</i>	x	Marginal	✓	✓	Unlikely	✓
Sooty Owl <i>Tyto tenebricosa</i> DPIE	V	-	Tall, dense, wet forests containing trees with very large hollows. <i>Distribution limit: N-Border Ranges National Park. S-South of Eden.</i>	x	x	-	-	x	x
Brown Treecreeper <i>Climacteris picumnus victoriae</i> DPIE	V	-	Occupies eucalypt woodlands, open woodland lacking a dense understorey with fallen dead timber. <i>Distribution limit: (Sub species victoriae) Central NSW west of Great Div. Cumberland Plains, Hunter Valley, Richmond, Clarence, and Snowy River Valleys.</i>	x	x	-	-	x	x

Common name Scientific name Database source	BC Act	EPBC Act	Preferred habitat Distribution limit	Recorded on site (✓)	If not recorded on site				Considered in assessment of significance test (✓) Refer to Appendix 3
					Suitable habitat present (✓)	Nearby and/or high number of record(s) (✓) <i>Notes 1,2 & 3</i>	Record(s) from recent years (✓) <i>Notes 1,2 & 3</i>	Potential to occur	
Eastern Bristlebird <i>Dasyornis brachypterus</i> EPBC	E	E	Coastal woodlands, dense scrubs and heathlands, especially where low heathland borders taller woodland or dense tall tea-tree. <i>Distribution limit: N-Tweed Heads. S-South of Eden.</i>	x	x	-	-	x	x
Regent Honeyeater <i>Xanthomyza phrygia</i> DPIE EPBC	E4A	CE	Found in temperate eucalypt woodland and open forest including forest edges, wooded farmland and urban areas with mature eucalypts. <i>Distribution limit: N-Urbanville. S-Eden.</i>	x	x	-	-	x	x
White-fronted Chat <i>Epithianura albifrons</i> DPIE	V	-	Found in open damp ground, grass clumps, fencelines, heath, samphire saltmarshes, mangroves, dunes, saltbush plains. <i>Distribution limit: N-Tweed Heads. S-South of Eden.</i>	x	x	-	-	x	x
Painted Honeyeater <i>Grantiella picta</i> EPBC	V	V	A nomadic bird occurring in low densities within open forest, woodland and scrubland feeding on mistletoe fruits. Inhabits primarily Boree, Brigalow and Box-Gum Woodlands and Box-Ironbark Forests. <i>Distribution limit: N-Boggabilla. S-Albury with greatest occurrences on the inland slopes of the Great Dividing Range.</i>	x	x	-	-	x	x
Black-chinned Honeyeater <i>Melithreptus gularis gularis</i> DPIE	V	-	Found in woodlands containing box-ironbark associations and River Red Gums, also drier coastal woodlands of the Cumberland Plain and Hunter Richmond and Clarence. <i>Distribution limit: N-Cape York Pen. Qld. S-Victor H. Mt Lofty Ra & Flinders Ra. SA.</i>	x	x	-	-	x	x
Varied Sittella <i>Daphoenositta chrysoptera</i> DPIE	V	-	Open eucalypt woodlands / forests (except heavier rainforests); mallee, inland acacia, coastal tea-tree scrubs; golf courses, shelterbelts, orchards, parks, scrubby gardens. <i>Distribution limit: N-Border Ranges National Park. S-South of Eden.</i>	x	Marginal	✓	X	Unlikely	✓

Common name Scientific name Database source	BC Act	EPBC Act	Preferred habitat Distribution limit	Recorded on site (✓)	If not recorded on site				Considered in assessment of significance test (✓) Refer to Appendix 3
					Suitable habitat present (✓)	Nearby and/or high number of record(s) (✓) <i>Notes 1,2 & 3</i>	Record(s) from recent years (✓) <i>Notes 1,2 & 3</i>	Potential to occur	
Dusky Woodswallow <i>Artamus cyanopterus cyanopterus</i> DPIE	V	-	Found in woodlands and dry open sclerophyll forests, usually dominated by eucalypts, including mallee associations. It has also been recorded in shrublands and heathlands and various modified habitats, including regenerating forests; very occasionally in moist forests or rainforests. Prefers habitat with an open understorey. Often observed in farmland tree patches or roadside remnants. <i>Widespread in eastern, southern and south-western Australia.</i>	x	Marginal	✓	✓	Unlikely	✓
Scarlet Robin <i>Petroica boodang</i> DPIE	V	-	Found in foothill forests, woodlands, watercourses; in autumn-winter, more open habitats: river red gum woodlands, golf courses, parks, orchards, gardens. <i>Distribution limit: N-Tweed Heads. S-South of Eden.</i>	x	Marginal	✓	X	Unlikely	✓
Flame Robin <i>Petroica phoenicea</i> DPIE	V	-	Summer: forests, woodlands, scrubs, from sea-level to c. 1800 m. Autumn-winter: open woodlands, plains, paddocks, golf courses, parks, orchards. <i>Distribution limit: N northern NSW tablelands. S-South of Eden.</i>	x	Marginal	x	X	Not likely	x
Pink Robin <i>Petroica rodinogaster</i> DPIE	V	-	Found in dense gullies, rainforests and open forests, dispersing into drier more open habitats in winter. <i>Distribution limit: N-Sydney. S-South of Eden.</i>	x	x	-	-	x	x
Diamond Firetail <i>Stagonopleura guttata</i> DPIE	V	-	Found in eucalypt woodlands, forests and mallee where there is grassy understorey west of the Great Div. also drier coastal woodlands of the Cumberland Plain and Hunter Richmond and Clarence River Valleys. <i>Distribution limit: N-Rockhampton Q. S-Eyre Pen Kangaroo Is. SA.</i>	x	x	-	-	x	x

Common name Scientific name Database source	BC Act	EPBC Act	Preferred habitat Distribution limit	Recorded on site (✓)	If not recorded on site				Considered in assessment of significance test (✓) Refer to Appendix 3
					Suitable habitat present (✓)	Nearby and/or high number of record(s) (✓) Notes 1,2 & 3	Record(s) from recent years (✓) Notes 1,2 & 3	Potential to occur	
Spotted-tailed Quoll <i>Dasyurus maculatus</i> DPIE EPBC	V	E	Dry and moist open forests containing rock caves, hollow logs or trees. <i>Distribution limit: N-Mt Warning National Park. S-South of Eden.</i>	x	x	-	-	x	x
Southern Brown Bandicoot <i>Isodon obesulus</i> EPBC	E	E	Utilises a range of habitats containing thick ground cover - open forest, woodland, heath, cleared land, urbanised areas and regenerating bushland. <i>Distribution limit: N-Kempsey. S-South of Eden.</i>	x	Marginal	✓	✓	Not likely	x
Koala <i>Phascolarctos cinereus</i> DPIE EPBC	V	V	Inhabits both wet and dry eucalypt forest on high nutrient soils containing preferred feed trees. <i>Distribution limit: N-Tweed Heads. S-South of Eden.</i>	x	x	-	-	x	x
Eastern Pygmy Possum <i>Cercatetus nanus</i> DPIE	V	-	Found in a variety of habitats from rainforest through open forest to heath. Feeds on insects but also gathers pollen from banksias, eucalypts and bottlebrushes. Nests in banksias and myrtaceous shrubs. <i>Distribution limit: N-Tweed Heads. S-Eden.</i>	x	x	-	-	x	x
Yellow-bellied Glider <i>Petaurus australis</i> DPIE	V	-	Tall mature eucalypt forests with high nectar producing species and hollow bearing trees. <i>Distribution limit: N-Border Ranges National Park. S-South of Eden.</i>	x	x	-	-	x	x
Squirrel Glider <i>Petaurus norfolcensis</i> DPIE	V	-	Mixed aged stands of eucalypt forest & woodlands including gum barked & high nectar producing species & hollow bearing trees. <i>Distribution limit: N-Tweed Heads. S-Albury.</i>	x	x	-	-	x	x

Common name Scientific name Database source	BC Act	EPBC Act	Preferred habitat Distribution limit	Recorded on site (✓)	If not recorded on site				Considered in assessment of significance test (✓) Refer to Appendix 3
					Suitable habitat present (✓)	Nearby and/or high number of record(s) (✓) Notes 1,2 & 3	Record(s) from recent years (✓) Notes 1,2 & 3	Potential to occur	
Greater Glider <i>Petauroides volans</i> DPIE EPBC	-	V	Favours forests with a diversity of eucalypt species, due to seasonal variation in its preferred tree species. Population density is optimal at elevation levels at 845 m above sea level. Prefer overstorey basal areas in old-growth tree stands. Highest abundance typically in taller, montane, moist eucalypt forests, with relatively old trees and abundant hollows <i>Distribution limit: N-Border Ranges National Park. S- South of Eden.</i>	x	x	-	-	x	x
Brush-tailed Rock-wallaby <i>Petrogale penicillata</i> DPIE EPBC	E	V	Found in rocky gorges with a vegetation of rainforest or open forests to isolated rocky outcrops in semi-arid woodland country. <i>Distribution limit: N-North of Tenterfield. S-Bombala.</i>	x	x	-	-	x	x
Grey-headed Flying-fox <i>Pteropus poliocephalus</i> DPIE EPBC	V	V	Found in a variety of habitats including rainforest, mangroves, paperbark swamp, wet and dry open forest and cultivated areas. Forms camps commonly found in gullies and in vegetation with a dense canopy. <i>Distribution limit: N-Tweed Heads. S-Eden.</i>	x	✓	✓	✓	✓	✓
Yellow-bellied Sheathtail-bat <i>Saccolaimus flaviventris</i> DPIE	V	-	Rainforests, sclerophyll forests and woodlands. <i>Distribution limit: N-North of Walgett. S-Sydney.</i>	u	Marginal	✓	✓	Low	✓
Eastern Coastal Free-tailed Bat <i>Micronomus norfolkensis</i> DPIE	V	-	Inhabits open forests and woodlands foraging above the canopy and along the edge of forests. Roosts in tree hollows, under bark and buildings. <i>Distribution limit: N-Woodenbong. S-Pambula.</i>	x	Marginal	✓	✓	Low	✓

Common name Scientific name Database source	BC Act	EPBC Act	Preferred habitat Distribution limit	Recorded on site (✓)	If not recorded on site				Considered in assessment of significance test (✓) Refer to Appendix 3
					Suitable habitat present (✓)	Nearby and/or high number of record(s) (✓) <i>Notes 1,2 & 3</i>	Record(s) from recent years (✓) <i>Notes 1,2 & 3</i>	Potential to occur	
Large-eared Pied Bat <i>Chalinolobus dwyeri</i> DPIE EPBC	V	V	Warm-temperate to subtropical dry sclerophyll forest and woodland. Roosts in caves, tunnels and tree hollows in colonies of up to 30 animals. <i>Distribution limit: N-Border Ranges National Park. S-Wollongong.</i>	x	Marginal	✓	✓	Low	✓
Eastern False Pipistrelle <i>Falsistrellus tasmaniensis</i> DPIE	V	-	Recorded roosting in caves, old buildings and tree hollows. <i>Distribution limit: N-Border Ranges National Park. S-Pambula.</i>	x	Marginal	✓	✓	Low	✓
Southern Myotis <i>Myotis macropus</i> DPIE	V	-	Roosts in caves, mines, tunnels, buildings, tree hollows and under bridges. Forages over open water. <i>Distribution limit: N-Border Ranges National Park. S-South of Eden.</i>	x	Marginal	✓	✓	Unlikely	✓
Greater Broad-nosed Bat <i>Scoteanax rueppellii</i> DPIE	V	-	Inhabits areas containing moist river and creek systems, especially tree lined creeks. <i>Distribution limit: N-Border Ranges National Park. S-Pambula.</i>	x	Marginal	✓	✓	Unlikely	✓
Little Bent-winged Bat <i>Miniopterus australis</i> DPIE	V	-	Roosts in caves, old buildings and structures in the higher rainfall forests along the south coast of Australia. <i>Distribution limit: N-Border Ranges National Park. S-Sydney.</i>	x	Marginal	✓	✓	Low	✓

Common name <i>Scientific name</i> <small>Database source</small>	BC Act	EPBC Act	Preferred habitat <i>Distribution limit</i>	Recorded on site (✓)	If not recorded on site				Considered in assessment of significance test (✓) Refer to Appendix 3
					Suitable habitat present (✓)	Nearby and/or high number of record(s) (✓) <i>Notes 1,2 & 3</i>	Record(s) from recent years (✓) <i>Notes 1,2 & 3</i>	Potential to occur	
Large Bent-winged Bat <i>Miniopterus orianae oceanensis</i> DPIE	V	-	Prefers areas where there are caves, old mines, old buildings, stormwater drains and well-timbered areas. <i>Distribution limit: N-Border Ranges National Park. S-South of Eden.</i>	✓	-	-	-	Recorded	✓
New Holland Mouse <i>Pseudomys novaehollandiae</i> EPBC	-	V	Occurs in heathlands, woodlands, open forest and paperbark swamps and on sandy, loamy or rocky soils. Coastal populations have a marked preference for sandy substrates, a heathy understorey of leguminous shrubs less than 1m high and sparse ground litter. Recolonise of regenerating burnt areas. <i>Distribution limit: N-Border Ranges National Park. S-South of Eden.</i>	x	x	-	-	x	x
The Golden Sun Moth <i>Synemon plana</i> EPBC	E	-	Inhabits natural treeless grasslands containing <i>Austrodanthonia carphoides</i> . <i>Distribution limit: Southern Tablelands and South West Slopes.</i>	x	x	-	-	x	x
Cumberland Plain Land Snail <i>Meridolum corneovirens</i> DPIE	E	-	Inhabits remnant eucalypt woodland of the Cumberland Plan. Shelters under logs, debris, clumps of grass, around base of trees and burrowing into loose soil. <i>Distribution limit: Cumberland Plain of Sydney Basin Bioregion.</i>	x	x	-	-	x	x
Dural Land Snail <i>Pommerhelix duralensis</i> EPBC	E	E	Occurs on shale-sandstone transitional forest landscapes within the Blue Mountains, Penrith, The Hills, Wollondilly, Hornsby and Parramatta LGA's. Occurs in low abundance and shelters under rocks or inside curled-up bark, beneath leaves and light woody debris. <i>Distribution limit: St Albans to Mulgoa with most records from The Hills LGA.</i>	x	x	-	-	x	x
DPIE	Denotes species listed within 10km of the development footprint on the <i>Atlas of NSW Wildlife</i>								

Common name <i>Scientific name</i> Database source		BC Act	EPBC Act	Preferred habitat <i>Distribution limit</i>	Recorded on site (✓)	If not recorded on site			Considered in assessment of significance test (✓) Refer to Appendix 3
						Suitable habitat present (✓)	Nearby and/or high number of record(s) (✓) <i>Notes 1,2 & 3</i>	Record(s) from recent years (✓) <i>Notes 1,2 & 3</i>	
EPBC	Denotes species listed within 10km of the development footprint in the <i>EPBC Act</i> habitat search								
TBE	Denotes additional species considered by <i>Travers bushfire & ecology</i> to have potential habitat based on regional knowledge and other records								
V	Denotes vulnerable listed species under the relevant Act								
E or E1	Denotes endangered listed species under the relevant Act								
E4a or CE	Denotes critically endangered listed species under the relevant Act								
NOTE:	1. This field is not considered if no suitable habitat is present within the development footprint 2. ‘records’ refer to those provided by the <i>Atlas of NSW Wildlife</i> 3. ‘nearby’ or ‘recent’ records are species specific accounting for home range, dispersal ability and life cycle								
Unlikely	Represents such a low margin but not enough to 100% rule it one. A test of significance is required.								
Not likely	Means 0% change of occurring, despite there being potential habitat. A test of significance is not applied to these species.								

A detailed assessment in accordance with Section 1.7 of the *EPA Act* will be completed for these species in Appendix 3 of this report.

Table 9 provides an assessment of potential habitat within the study area for nationally *protected* migratory fauna species recorded within 10 km on the *EPBC Act* Protected Matters Tool. Nationally *threatened* migratory species are instead considered above in Table 8.

Table 9 – Protected migratory bird habitat assessment (Appendix 2)

Common name <i>Scientific name</i>	Preferred habitat <i>Migratory breeding</i>	Suitable habitat present (✓)	Recorded on site (✓)	Comments
Oriental Cuckoo (<i>Cuculus optatus</i>)	Mainly inhabits forests, occurring in coniferous, deciduous and mixed forest. It feeds mainly on insects and their larvae, foraging for them in trees and bushes as well as on the ground.	x	x	-
Fork-tailed Swift (<i>Apus pacificus</i>)	Aerial: over open country, from semi-arid deserts to coasts, islands; sometimes over forests, cities. Breeds Siberia, Himalayas, east to Japan south east Asia. Summer migrant to east Australia. Mass movements associated with late summer low pressure systems into east Australia. Otherwise uncommon.	✓	x	-
Rainbow Bee-eater (<i>Merops ornatus</i>)	Open woodlands with sandy, loamy soil; sandridges, sandspits, riverbanks, road cuttings, beaches, dunes, cliffs, mangroves, rainforest, woodlands, golf courses. <i>Breeding resident in northern Australia. Summer breeding migrant to south east and south west Australia.</i>	✓	x	-
Black-faced Monarch (<i>Monarcha melanopsis</i>)	Rainforests, eucalypt woodlands; coastal scrubs; damp gullies in rainforest, eucalypt forest; more open woodland when migrating. <i>Summer breeding migrant to coastal south east Australia, otherwise uncommon.</i>	x	x	-
Spectacled Monarch (<i>Monarcha trivirgatus</i>)	Understorey of mountain / lowland rainforest, thickly wooded gullies, waterside vegetation, mostly well below canopy. <i>Summer breeding migrant to south-east Qld and north-east NSW down to Port Stephens from Sept / Oct to May. Uncommon in southern part of range.</i>	x	x	-
Satin Flycatcher (<i>Myiagra cyanoleuca</i>)	Heavily vegetated gullies in forests, taller woodlands, usually above shrub-layer; during migration, coastal forests, woodlands, mangroves, trees in open country, gardens. <i>Breeds mostly south-east Australia and Tasmania over warmer months, winters in north east Qld.</i>	✓	x	-
Rufous Fantail (<i>Rhipidura rufifrons</i>)	Undergrowth of rainforests / wetter eucalypt forests / gullies; monsoon forests, paperbarks, sub-inland and coastal scrubs; mangroves, watercourses; parks, gardens. On migration, farms, streets buildings. <i>Breeding migrant to south-east Australia over warmer months. Altitudinal migrant in north-east NSW in mountain forests during warmer months.</i>	x	x	-
Yellow Wagtail (<i>Motacilla flava</i>)	The yellow wagtail typically forages in damp grassland and on relatively bare open ground at edges of rivers, lakes and wetlands, but also feeds in dry grassland and in fields of cereal crops.	x	x	-

Appendix 3

Test of Significance

Flora and fauna survey and habitat assessments of the study area have resulted in the identification of suitable habitat for the following threatened biodiversity that was recorded present or considered otherwise with varying potential to occur. The potential for any direct or indirect impacts on species has been considered and noted.

The site is very heavily degraded with almost no native understorey. As such it was considered too degraded to likely host threatened flora species (unless they were planted).

Table 10 – Threatened fauna impact summary (Appendix 3)

Common name	BC Act	Potential to occur	Potential habitat impact
Little Lorikeet	V	Recorded	Direct – on potential seasonal foraging
Large Bent-winged Bat	V	Recorded	Indirect – on potential foraging
Grey-headed Flying-fox	V	✓	Direct – on potential seasonal foraging
Little Eagle	V	Low	None anticipated
Yellow-bellied Sheath-tail-bat	V	Low	Indirect – on potential foraging
Eastern Coastal Free-tailed Bat	V	Low	Indirect – on potential foraging
Large-eared Pied Bat	V	Low	Indirect – on potential foraging
Eastern False Pipistrelle	V	Low	None anticipated
Little Bent-winged Bat	V	Low	Indirect – on potential foraging
Spotted Harrier	V	Unlikely	None anticipated
White-bellied Sea Eagle	V	Unlikely	None anticipated
Square-tailed Kite	V	Unlikely	None anticipated
Regent Honeyeater	E4A	Unlikely	None anticipated
Swift Parrot	E	Unlikely	Indirect – on low potential foraging
Powerful Owl	V	Unlikely	Indirect – on low potential foraging
Masked Owl	V	Unlikely	Indirect – on low potential foraging
Varied Sittella	V	Unlikely	Direct – on potential foraging
Dusky Woodswallow	V	Unlikely	Indirect – on low potential foraging and unlikely roosting
Scarlet Robin	V	Unlikely	Indirect – on low potential foraging
Southern Myotis	V	Unlikely	None anticipated
Greater Broad-nosed Bat	V	Unlikely	None anticipated

Threatened ecological communities

- Shale Gravel Transition Forest

BC ACT 2016 - SECTION 7.3 TEST OF SIGNIFICANCE

As outlined in Section 7.2 of the *BC Act* development or an activity is *likely to significantly affect threatened species* if:

- It is likely to significantly affect threatened species or ecological communities, or their habitats, according to the test in Section 7.3, or
- The development exceeds the threshold if the BOS applies to the impacts of the development on biodiversity values, or

- (c) It is carried out in a declared area of outstanding biodiversity value.

With respect to (a) above, and outlined in Section 7.3 of the *BC Act*, the following *test of significance* is a set of five main considerations, with sub-considerations for determining whether proposed development or activity likely to significantly affect threatened species or ecological communities, or their habitats.

a) In the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,

The direct and indirect impacts of the proposal are considered within Section 5.2.

With consideration to the relative direct and indirect impacts on all threatened species with varying potential to occur, it is considered that the proposal is unlikely to disrupt the life cycle for any of these listed species such that a viable local population would be placed at risk of extinction. Species recorded present during survey, previously recorded nearby or with high potential to occur and requiring further discussion given potential impacts are further discussed in detail below.

Summary of threatened species recorded or with high potential to occur

Little Lorikeet (*Glossopsitta pusilla*)

Little Lorikeets mostly occur in dry, open eucalypt forests and woodlands. Little Lorikeets are gregarious, usually foraging in small flocks, often with other species of lorikeet. They feed primarily on nectar and pollen in the tree canopy, particularly on profusely-flowering eucalypts, but also on a variety of other species including Melaleucas and mistletoes.

There is no evidence of regular migration, but Little Lorikeets are generally considered to be nomadic (Higgins 1999), with irregular large or small influxes of individuals occurring at any time of year, apparently related to food availability. Long term investigations indicate that breeding birds are resident from April to December, and even during their non-resident period, they may return to the nest area for short periods if there is some tree-flowering in the vicinity (Courtney & Debus 2006).

Approximately 3 cm diameter nest hollows are located mostly in living, smooth-barked eucalypts, and are kept open by the activities of the occupants, which use their beaks to bite away living bark from around the opening. When nest hollows are deserted, e.g. after storm-damage to trees, hollows can close over within 14 months (Courtney & Debus 2006). Nest hollows are occasionally located in dead trees, but birds generally desert hollows within two years of tree death. Nest-hollows are used “traditionally”, with the same hollow (not necessarily by the same individuals) (Courtney & Debus 2006). The breeding season extends from May to September (Higgins 1999) and, if eucalypt nectar and pollen are available throughout this period, two broods of fledglings can be raised in a season.

The major threats to Little Lorikeets are loss of breeding sites and food resources from ongoing land clearing. New nest hollows are not being recruited at a rate that compensates this loss.

It is distributed widely across the coastal and Great Divide regions of eastern Australia from Cape York to South Australia. NSW provides a large portion of the species' core habitat, with

lorikeets found westward as far as Dubbo and Albury. Nomadic movements are common, influenced by season and food availability, although some areas retain residents for much of the year and 'locally nomadic' movements are suspected of breeding pairs. The Little Lorikeet roosts in treetops, often distant from feeding areas but nests in proximity to feeding areas if possible. The Nesting season extends from May to September. In years when flowering is prolific, Little Lorikeet pairs can breed twice, producing 3-4 young per attempt. However, the survival rate of fledglings is unknown.

Little Lorikeet was recorded on the 22 of July 2020 during diurnal survey flying over the study area. However, the development footprint provides only seasonal foraging habitat for Little Lorikeet as no suitable roosting or hollows for breeding habitat is present. 0.195 ha of seasonal foraging habitat may be impacted. However, this is otherwise well represented in the surrounding locality such that removal of habitat will not significantly impact on a local population. It is recommended that foraging habitat is replaced by locally native flowering eucalypts within landscaping areas.

Swift Parrot (*Lathamus discolor*)

This species feeds mainly on nectar and lerp from eucalypt flowers, particularly Blue Gum (*Eucalyptus globulus*). On the mainland, the Swift Parrot congregates where winter flowering species occur such as Red Ironbark (*Eucalyptus sideroxylon*), White Box (*Eucalyptus albens*), Yellow Gum (*Eucalyptus leucoxylon*) and Swamp Gum (*Eucalyptus ovata*) (Brown, 1989). This species also occurs within Swamp Mahogany (*Eucalyptus robusta*) or Spotted Gum (*Corymbia maculata*) dominated communities along the coast. The Swift Parrot is a migratory species that breeds in Tasmania and its offshore islands in summer. In late March almost the entire population migrates to mainland Australia spreading from Victoria through to central and coastal NSW and south east Queensland (Schodde and Tidemann, 1986).

Swift Parrot was not recorded survey. However, the development footprint provides minimal foraging with only two recorded winter flowering eucalypts. However, this is otherwise well represented in the surrounding locality such that removal of habitat will not significantly impact on a local population. It is recommended that foraging habitat is replaced by locally native winter flowering eucalypts within landscaping areas.

Regent Honeyeater (*Xanthomyza phrygia*)

The Regent Honeyeater was once common in wooded areas of eastern Australia, especially along the inland slopes of the Great Dividing Range. The population is now scattered with little information available on movement patterns. The three main current breeding areas are the Bundarra-Barraba area and Capertee Valley of New South Wales, and north-eastern Victoria.

The Regent Honeyeater inhabits mostly dry eucalypt woodlands and forests dominated by box ironbark eucalypts; on inland slopes of Great Divide, especially associations in moister more fertile sites, along creeks, broad river valleys and on lower slopes of foothills. (Higgins, Peter & Steele 2001). Nectar is the principal food but sugary exudates from insects are also used (Oliver 1998, 2000).

Regent Honeyeater was not recorded survey. However, the development footprint provides minimal foraging with only two recorded winter flowering eucalypts. However, this is otherwise well represented in the surrounding locality such that removal of habitat will not significantly impact on a local population. It is recommended that foraging habitat is replaced by locally native winter flowering eucalypts within landscaping areas.

Grey-headed Flying-fox (*Pteropus poliocephalus*)

Grey-Headed Flying-foxes are canopy feeding frugivores and nectarivores, inhabiting a wide range of habitats including rainforest, mangroves, paperbark forests, wet and dry sclerophyll forests and cultivated areas. This species roosts in camps, which may contain tens of thousands of individuals.

Camps are commonly formed in gullies, typically not far from water and usually in vegetation with a dense canopy (Tidemann 1998). Camps can be found in riparian rainforest patches, Melaleuca stands, mangroves, riparian woodland or modified vegetation in urban areas. Loyalty to a site is high and some camps in NSW have been used for over a century (NSW NPWS 2001). Some camps are used at the same time every year by hundreds of thousands of flying-foxes while others are used sporadically by a few hundred individuals (Strahan 1995). Generally foraging is within 20km of camps but individuals are known to commute up to 50km to a productive food source.

Grey-headed Flying-fox was not recorded during survey. However, the development footprint provides only seasonal foraging habitat for the Grey-headed Flying-fox as no suitable roosting or subsequent breeding habitat is present. Foraging habitat is otherwise well represented in the surrounding locality such that removal of habitat will not significantly impact on a local population. It is recommended that foraging habitat is replaced by locally native flowering eucalypts within landscaping areas.

Little Bent-winged Bat & Large Bent-winged Bat (*Miniopterus australis* and *Miniopterus schreibersii* subsp. *oceanensis*)

These two species are considered here together because of their similar roosting/breeding habitat requirements and subsequent assessment outcome.

The Little Bent-winged Bat forages below the canopy within open forests and woodlands, feeding on small insects (Dwyer 1995b). This species roosts in caves, tunnels, tree hollows and occasionally old buildings (Dwyer 1995b). Caves are an important resource for this species, particularly for breeding where maternity caves must have suitable temperature, humidity and physical dimensions to permit breeding (Dwyer 1995b). One record exists of this species utilising a tree hollow however hollows are not currently considered as preferred habitat for this species (pers. com. Brad Law).

The Large Bent-winged Bat forages above and below the canopy within open forests and woodlands, feeding on small flying insects, predominantly moths (Dwyer 1995). The Large Bent-winged Bat is known to roost in a range of habitats including stormwater channels, under bridges, occasionally in buildings, old mines and, in particular, caves (Dwyer 1995). Caves are an important resource for this species, particularly for breeding where maternity caves must have suitable temperature, humidity and physical dimensions to permit breeding (Dwyer 1995). Roost sites in tree hollows have not been reported within the literature reviewed. This species has not been identified as utilising culverts for maternity roosts. Maternity roosts rather are occupied by up to 100 000 females with only 12 maternity roosts known throughout the complete range (Hoy & Hall 2008).

The Large Bent-winged was recorded within the study area overnight from the 22 of June 2020. It is considered that the development footprint provides suitable foraging only habitat for the Little Bent-winged Bat and Large Bent-winged Bat. The Little Bent-winged Bat would forage more predominantly below the canopy where an open structure below the shrub layer permits. The Large Bent-winged Bat would forage more predominantly above the canopy and down in more open areas. Concentrated activity is likely in some locations such as along the creek, forest fringes and trails, particularly for the Large Bent-winged Bat.

Whilst foraging by both species may be more concentrated in some habitats (most based on structure and insect activity) no specific valued habitat features within the study area are identified. No important roosting or breeding habitat is likely present within the study area. Roosting locations are expected to occur throughout the locality and many of these are likely within man-made structures.

Given the highly mobile nature of both of these species, the absence of any important habitat, their known ability to move across and utilise some urban landscapes and that the proposed development will not inhibit local movements and dispersal, neither species will be likely significantly impacted by the proposed habitat clearance.

b) In the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

i. Is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

A very poor remnant of Shale Gravel Transition Forest persists on site. This community is listed as endangered under the *BC Act*. It may also form part of the *EPBC Act* critically endangered ecological community Cumberland Plain Shale Woodlands and Shale Gravel Transition Forest, however it does not meet the threshold criteria.

Only a small proportion of trees are proposed for removal (refer to Arborist report) for the proposal and as they don't contain hollows, are not considered important to the breeding habitat for any threatened fauna species.

Whilst only a few trees are proposed for removal, there will be impacts upon the ground layer of vegetation and its future ability for self-seeding. This is already highly compromised because cars are currently allowed to park amongst the trees within the tree protection zones that compacts the soil and severely diminishes the ability for regrowth. The majority of the ground layer is exotic grasses and herbs with native species comprising less than 10% coverage. As such the long-term likelihood of the communities' survival on site is already hindered.

The proposal will require impacts upon the remnants over 0.195 ha at most. It is likely that the proposed mitigation measures described in section 5.6 would provide a better outcome in the future than what current exists if native plants of this TEC are utilised in the proposed landscaping.

The fragments on site have limited connectivity to largely canopy trees that align the fairways of the golf course.

Given the above, the small-scale impacts are unlikely to exacerbate the natural decline of the fragments such that the local occurrence is placed at risk of local extinction.

ii. Is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

Only the canopy is semi-intact, however the current land use would not allow regeneration of the canopy. There is no mid-storey or shrub species present. The ground layer of vegetation contains less than 10% native species.

The proposal will only see the removal of a small percentage of the trees and given there is no natural regeneration, there would only be a limited impact that could be ameliorated through new plantings of locally occurring native tree species of Shale Gravel Transition Forest origin.

The ground layer will be further impacted through ongoing management. In review of the species list in Appendix 1, there are only a small number of native species present, many of which are generic to a lot of the dry sclerophyll or floodplain vegetation types in coastal NSW, none of which are specific only to Shale Gravel Transition Forest. These may easily be replaced through strategic landscaping, therefore it is considered that the proposal will not adversely modify the composition of this community such that its local occurrence is likely to be placed at risk of extinction.

c) In relation to the habitat of threatened species or ecological community:

It is considered that the habitat attributes of the development footprint provide known or potential habitat for Shale Gravel Transition Forest, Little Eagle, Spotted Harrier, White-bellied Sea Eagle, Little Lorikeet, Square-tailed Kite, Swift Parrot, Powerful Owl, Masked Owl, Regent Honeyeater, Varied Sittella, Dusky Woodswallow, Scarlet Robin, Grey-headed Flying-fox, Large-eared Pied Bat, Eastern False Pipistrelle, Southern Myotis, Greater Broad-nosed Bat, Little Bent-winged Bat, Large Bent-winged Bat, Eastern Coastal Free-tailed Bat and Yellow-bellied Sheath-tail Bat.

i. The extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and

The development footprint will require the removal of a small proportion of trees and ongoing management of the ground layer. The upper limit of likely impact is 0.195 ha, largely caused through the requirement of understorey maintenance or loss of understorey which is of very poor condition.

The initial loss or impact upon vegetation will have a very small impact by making the existing fragments slightly smaller. The proposed mitigation measures of 50% planting of native species in landscaping beds may assist in providing an improvement on the current situation mostly through shrubs planting.

ii. Whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

The development footprint contains heavily disturbed remnant vegetation that is highly modified and fragmented from past land use, and continues to be suppressed by ongoing maintenance and car parking. The majority of trees will be retained within the landscape to limit further fragmentation and future landscaping will provide for additional trees and shrubs to mitigate any vegetation loss. As such, the proposal will not likely exacerbate any fragmentation or isolation issues.

iii. The importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality

In respect to threatened fauna species recorded or with potential to occur within the proposed area of impact is not likely of high quality, of any breeding importance or central to the home

range requirements of any species such that behaviour or ecology of these species will be significantly altered in any way.

The vegetation within the study area is highly degraded with no mid-storey present and management of the understorey (mowing) coupled with car parking on grassed areas that would inhibit natural regeneration. The vegetation remnants are also fragmented. As such, it was considered that the presence of any threatened flora species was unlikely. As a precaution however, searches were undertaken for *Pimelea spicata* and *Acacia pubescens*. No specimens of either species were found.

Whilst the proposal impacts TEC vegetation, its quality is poor. There are canopy trees, most of which are quite mature but because of the understorey maintenance and car parking, there is no chance of natural recruitment of new seedlings. There is currently no natural mid-storey and the understorey is predominantly exotic species. The impact area of 0.195 ha largely relates to continued understorey maintenance or removal. Only a small proportion of trees will be required to be removed. The proposal seeks to incorporate native species planting into the landscaping that can replace any trees being removed, and enhance the mid-storey and ground layer for an improved outcome. As such, it is considered that the small impact on the TEC vegetation is only minor.

d) Whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),

The development footprint is not within any declared area of outstanding biodiversity value. Therefore, the proposal will not have any adverse effects on any declared area of outstanding biodiversity value (either directly or indirectly).

e) Whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.

A key threatening process is defined as a process that threatens, or could threaten, the survival or evolutionary development of species, populations or ecological communities.

The current list of key threatening processes, and whether the proposed activity is recognised as a threatening process, is shown below.

Table 11 – Key threatening processes (Appendix 3)

Listed key threatening process (as described in the final determination of the Scientific Committee to list the threatening process)	Is the development or activity proposed of a class of development or activity that is recognised as a threatening process?		
	Likely	Possible	Unlikely
Aggressive exclusion of birds by Noisy Miners (<i>Manorina melanoccephala</i>)		✓	
Alteration of habitat following subsidence due to longwall mining			✓
Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands			✓

Listed key threatening process (as described in the final determination of the Scientific Committee to list the threatening process)	Is the development or activity proposed of a class of development or activity that is recognised as a threatening process?		
	Likely	Possible	Unlikely
Anthropogenic Climate Change			✓
Bushrock removal			✓
Clearing of native vegetation	✓		
Competition and habitat degradation by feral goats			✓
Competition and grazing by the feral European Rabbit (<i>Oryctolagus cuniculus</i>)			✓
Competition from feral honeybees			✓
Death or injury to marine species following capture in shark control programs on ocean beaches			✓
Entanglement in, or ingestion of anthropogenic debris in marine and estuarine environments			✓
Forest Eucalypt dieback associated with over-abundant psyllids and bell miners			✓
High frequency fire resulting in the disruption of life-cycle processes in plants and animals and loss of vegetation structure and composition			✓
Herbivory and environmental degradation caused by feral deer			✓
Importation of red imported fire ants into NSW			✓
Infection by <i>Psittacine circoviral</i> (beak and feather) disease affecting endangered psittacine species and populations			✓
Infection of frogs by amphibian chytrid causing the disease chytridiomycosis			✓
Introduction and establishment of Exotic Rust Fungi of the order Pucciniales pathogenic on plants of the family Myrtaceae		✓	
Infection of native plants by <i>Phytophthora cinnamomi</i>		✓	
Introduction of the large earth bumblebee (<i>Bombus terrestris</i>)			✓
Invasion and establishment of exotic vines and scramblers			✓
Invasion and establishment of Scotch Broom (<i>Cytisus scoparius</i>)			✓
Invasion and establishment of the Cane Toad (<i>Bufo marinus</i>)			✓
Invasion, establishment and spread of <i>Lantana camara</i>			✓
Invasion of native plant communities by bitou bush & boneseed <i>Chrysanthemoides monilifera</i>			✓
Invasion of native plant communities by exotic perennial grasses		✓	
Invasion of native plant communities by African Olive (<i>Olea europaea</i> subsp. <i>cuspidata</i>)			✓
Invasion of the Yellow Crazy Ant (<i>Anoplolepis gracilipes</i>)			✓
Loss of Hollow-bearing trees			✓
Loss and degradation of native plant and animal habitat by		✓	

Listed key threatening process (as described in the final determination of the Scientific Committee to list the threatening process)	Is the development or activity proposed of a class of development or activity that is recognised as a threatening process?		
	Likely	Possible	Unlikely
invasion of escaped garden plants, including aquatic plants			
Loss and/or degradation of sites used for hill-topping by butterflies			✓
Predation and hybridisation by feral dogs (<i>Canis lupus familiaris</i>)			✓
Predation by the European Red Fox (<i>Vulpes vulpes</i>)			✓
Predation by the Feral Cat (<i>Felis catus</i>)			✓
Predation by <i>Gambusia holbrooki</i> Girard, 1859 (plague minnow or mosquito fish)			✓
Predation by the Ship Rat (<i>Rattus rattus</i>) on Lord Howe Island			✓
Predation, habitat degradation, competition & disease transmission from Feral pigs (<i>Sus scrofa</i>)			✓
Removal of dead wood and dead trees			✓

The above key threatening processes have been considered in reference to the proposal. It was considered that the proposal may contribute to a small degree to a number these processes as described below. It was not considered that the proposal will have a large or significant impact on any of the following key threatening processes. Some mitigation measures have been listed under each process to minimise or reduce such impacts upon those processes.

Summary of “likely” or “possible” Key Threatening Processes

This section identifies what mitigation measures can be implemented to address threatening processes.

Aggressive exclusion of birds by Noisy Miners (Manorina melanocephala)

Noisy Miners have been recorded present within the study area. It is likely that Noisy Miners from within the study area may be slightly displaced as a result of habitat removal for the development, resulting in increased impacts from this species on other native birds in the nearby surrounds. Given the high degree of disturbance in the local surrounds it is expected that the Noisy Miner is already at impacting numbers in these areas

Clearing of native vegetation

The proposal is of a class of development recognised as a threatening process. It is generally recommended that all sites should aim to achieve a maintain or improve outcome on the quality and quantity of native vegetation cover through protection and restoration measures. 0.195 ha and thirteen (13) trees are likely to be removed or impacted by the proposal. The main impact comes in the form of ground layer removal. Native species in the ground layer are quite sparse, comprising a very limited number of native grasses and herbs and not exceeding 10% coverage. If native landscaping is undertaken as per the mitigation measures to re-instate Shale Gravel Transition Forest within landscape beds to 50% coverage, this will likely provide a better outcome than what is present. Note too that the existing car parking at the golf course is too limited and cars continually park alongside the

trees, compacting the soil and spreading weed seeds, thereby not allowing natural regeneration to occur.

*Infection of native plants by *Phytophthora cinnamomi**

The proposal may temporarily increase the risk of fungal infection on site as it may be spread via vehicular movement and relocation of soil and vegetation. Consequently, standard *Phytophthora cinnamomi* protocol applies to the cleaning of all plant, equipment, hand tools and work boots prior to delivery onsite to ensure that there is no loose soil or vegetation material caught under or on the equipment and within the tread of vehicle tyres or tracks. Any equipment found to contain soil or vegetation material from offsite is to be cleaned in a quarantined work area or wash station and treated with anti-fungal pesticides prior to commencing work.

Introduction and establishment of Exotic Rust Fungi of the order Pucciniales pathogenic on plants of the family Myrtaceae

'Myrtle Rust' may be spread via machinery, animals and humans as well as by environmental factors such as wind. The presence of machinery and construction works is likely to slightly increase the potential for spread of this key threatening process. Similar protocols as to *Phytophthora cinnamomi* should be applied.

Invasion of native plant communities by exotic perennial grasses

The proposal is of a class of development recognised as a threatening process due to possible incursions of grasses such as *Pennisetum clandestinum* (Kikuyu). However, the vegetation within the development footprint is of a degraded nature and the proposed development is not expected to significantly increase the prevalence of exotic perennial grasses. Given the proposed 'tidy-up' to ensure sufficient car parking and landscaping, it is expected that the proposed development will decrease the number of exotic grass species and will provide an opportunity to manage the area with regard to weed invasion.

Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants

Proposed landscaping may have impacts upon remnant vegetation areas through invasion by escaped garden plants. To reduce this risk, the mitigation measures include the planting of at least 50% native species of Shale Gravel Transition Forest origin. Weed control should be undertaken at regular intervals to remove escaped garden seedlings and promote the regeneration of native species.

Appendix 4

SAll Assessment (Species)

SERIOUS AND IRREVERSIBLE IMPACT ASSESSMENT – Threatened Species

The additional impact assessment provisions for threatened species to determine a Serious and Irreversible Impact (SAII) are outlined under Section 10.2.3 of the BAM (2017). They have been applied to the Large Bent-winged Bat which was recorded:

a) The action and measures taken to avoid the direct and indirect impact on the potential entity for an SAII

No specific measures are considered necessary to apply to this species given that no important habitat will be likely directly or indirectly impacted.

b) The size of the local population directly and indirectly impacted by the development, clearing or biodiversity certification

Due to the migratory nature of this species to breeding caves within inland regions of the state, the local population is difficult to predict at any time. This species is expected to be well represented in the locality with regular recordings.

c) The extent to which the impact exceeds any threshold for the potential entity that is specified in the Guidance to assist a decision-maker to determine a serious and irreversible impact

No breeding habitat will be impacted for this species and no such habitat is present within the remaining development footprint.

d) The likely impact (including direct and indirect impacts) that the development, clearing or biodiversity certification will have on the habitat of the local population, including but not limited to:

(i) An estimate of the change in habitat available to the local population as a result of the proposed development

The habitat for this species will remain virtually unchanged. This species is known to forage along streetlights and around developed landscapes.

(ii) The proposed loss, modification, destruction or isolation of the available habitat used by the local population, and

The proposal will remove single trees which are unlikely to support prey species habitat. Otherwise the habitat is foraging airspace which will remain virtually unchanged.

(iii) Modification of habitat required for the maintenance of processes important to the species' life cycle (such as in the case of a plant – pollination, seed set, seed dispersal, germination), genetic diversity and long-term evolutionary development. BioNet Atlas records or other documented, quantifiable means must be used by the assessor to estimate what percentage of the species' population and

habitat is likely to be lost in the long term within the IBRA subregion due to the direct and indirect impacts of the development

No habitat important to the life-cycle of this species will be impacted.

e) The likely impact on the ecology of the local population. At a minimum, address the following:

(i) for Fauna:

- ***Breeding*** – No breeding habitat will be impacted
- ***Foraging*** – No foraging habitat will be impacted
- ***Roosting, and*** – No likely roosting will be impacted
- ***Dispersal or movement pathways*** – This species is highly mobile over urban landscapes. The proposal will not inhibit or reduce the local movement pathways.

(ii) for Flora, address how the proposal is likely to affect the ecology and biology of any residual plant population that will remain post development including where information is available:

- ***Pollination cycle*** – N/A
- ***Seedbanks*** – N/A
- ***Recruitment, and*** – N/A
- ***Interactions with other species*** – N/A
(E.g. pollinators, host species, mycorrhizal associations)

f) A description of the extent to which the local population will become fragmented or isolated as a result of the proposed development

The proposal will not likely cause any fragmentation or isolation of habitat for the local population.

g) The relationship of the local population to other population/populations of the species. This must include consideration of the interaction and importance of the local population to other population/populations for factors such as breeding, dispersal and genetic viability/diversity, and whether the local population is at the limit of the species' range

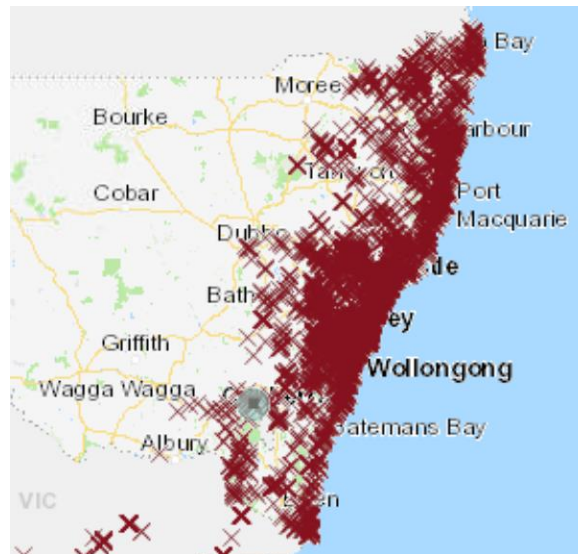
All individuals in the locality, region and extending out to this part of the state are part of the same population for this species.

h) The extent to which the proposed development will lead to an increase in threats and indirect impacts, including impacts from invasive flora and fauna, that may in turn lead to a decrease in the viability of the local population

No such threats are likely to arise from the development.

i) An estimate of the area, or number of populations and size of populations that is in the reserve system in NSW, the IBRA region and the IBRA subregion

This is difficult to predict for this species however each disperses from breeding locations throughout the eastern (mostly north-eastern) third of the state and foraging extent is expected to be relatively evenly represented in the reserve system in this part of NSW, as well as the subsequent IBRA region and the IBRA subregions. A map has been provided below sourced from the Species Action Statement (OEH 2020) showing conservation areas and recordings.



Large Bent-winged Bat

j) The measure/s proposed to contribute to the recovery of the species in the IBRA subregion.

- Control foxes and feral cats around roosting sites, particularly maternity caves.
- Retain native vegetation around roost sites, particularly within 300 m of maternity caves.
- Minimise the use of pesticides in foraging areas.
- Protect roosting sites from damage or disturbance.

None of the above measure are considered of relevance to the proposal. No roosting sites have been identified or are expected within the development footprint.

Appendix 5

EPBC significance assessment criteria

EPBC Act Significance Assessment Criteria

Under the *EPBC Act* an action will require approval from the Australian Government Environment Minister if the action has, will have, or is likely to have, a significant impact on a matter of national environmental significance. The following significant impact criteria were sourced from the *EPBC Act* Policy Statement 1.1 (May 2006):

CRITICALLY ENDANGERED AND ENDANGERED SPECIES

Significant impact criteria

An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:

- Lead to a long-term decrease in the size of a population;
- Reduce the area of occupancy of the species;
- Fragment an existing population into two or more populations;
- Adversely affect habitat critical to the survival of a species;
- Disrupt the breeding cycle of a population;
- Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;
- Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat;
- Introduce disease that may cause the species to decline; or
- Interfere with the recovery of the species.

>> What is a population of a species?

A 'population of a species' is defined under the *EPBC Act* as an occurrence of the species in a particular area. In relation to critically endangered, endangered or vulnerable threatened species, occurrences include but are not limited to:

- a geographically distinct regional population, or collection of local populations; or
- a population, or collection of local populations, that occurs within a particular bioregion.

>> What is habitat critical to the survival of a species or ecological community?

'Habitat critical to the survival of a species or ecological community' refers to areas that are necessary:

- For activities such as foraging, breeding, roosting, or dispersal;
- For the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators);
- To maintain genetic diversity and long-term evolutionary development; or
- For the reintroduction of populations or recovery of the species or ecological community.

Such habitat may be, but is not limited to: habitat identified in a recovery plan for the species or ecological community as habitat critical for that species or ecological community; and/or habitat listed on the Register of Critical Habitat maintained by the Minister under the *EPBC Act*.

VULNERABLE SPECIES

Significant impact criteria

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

- lead to a long-term decrease in the size of an important population of a species;
- reduce the area of occupancy of an important population;
- fragment an existing important population into two or more populations;
- adversely affect habitat critical to the survival of a species;
- disrupt the breeding cycle of an important population;
- modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;
- result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat;
- introduce disease that may cause the species to decline; or
- interfere substantially with the recovery of the species.

>> What is an important population of a species?

An 'important population' is a population that is necessary for a species' long-term survival and recovery. This may include populations identified as such in recovery plans, and/or that are:

- Key source populations either for breeding or dispersal;
- Populations that are necessary for maintaining genetic diversity; and/or
- Populations that are near the limit of the species range.

CRITICALLY ENDANGERED AND ENDANGERED ECOLOGICAL COMMUNITIES

Significant impact criteria

An action is likely to have a significant impact on a critically endangered or endangered ecological community if there is a real chance or possibility that it will:

- Reduce the extent of an ecological community;
- Fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines;
- Adversely affect habitat critical to the survival of an ecological community;
- Modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns;
- Cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting;
- Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to:
 - assisting invasive species, that are harmful to the listed ecological community, to become established; or
 - causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community; or
- Interfere with the recovery of an ecological community.

MIGRATORY SPECIES

Significant impact criteria

An action is likely to have a significant impact on a migratory species if there is a real chance or possibility that it will:

- Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species;
- Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species; or
- Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.

>> What is important habitat for a migratory species?

An area of 'important habitat' for a migratory species is:

- a) Habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species; and/or
- b) Habitat that is of critical importance to the species at particular life-cycle stages; and/or
- c) Habitat utilised by a migratory species which is at the limit of the species range; and/or
- d) Habitat within an area where the species is declining.

>> What is an ecologically significant proportion?

Listed migratory species cover a broad range of species with different life cycles and population sizes. Therefore, what is an 'ecologically significant proportion' of the population varies with the species (each circumstance will need to be evaluated). Some factors that should be considered include the species' population status, genetic distinctiveness and species-specific behavioural patterns (for example, site fidelity and dispersal rates).

>> What is the population of a migratory species?

'Population', in relation to migratory species, means the entire population or any geographically separate part of the population of any species or lower taxon of wild animals, a significant proportion of whose members cyclically and predictably cross one or more national jurisdictional boundaries including Australia.